PATENT ABSTRACTS OF JAPAN

(11)Publication number : 11-220655

(43)Date of publication of application : 10.08.1999

(51)Int.Cl. H04N 5/268
H04H 1/00
H04J 3/00
H04N 7/24

(21)Application number : 10-282609

(22)Date of filing : 05.10.1998

(71)Applicant : SONY CORP

(72)Inventor : TAWARA KATSUMI
YASUDA KANTA
NEGISHI SHINJI

(30)Priority

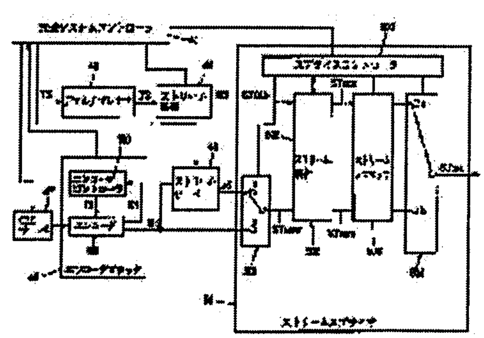
Priority number : 09271275 Priority date : 03.10.1997 Priority country : JP

(54) CODED STREAM SPLICING DEVICE AND METHOD THEREFOR, CODED STREAM GENERATING DEVICE AND METHOD THEREFOR AND INFORMATION PROCESSOR AND METHOD THEREFOR

(57)Abstract:

PROBLEM TO BE SOLVED: To realize a stream splicing device for generating a seamless spliced stream.

SOLUTION: An elementary stream obtained by converting the stream configuration of an original coded stream STOLD transmitted as a transport stream from a main station is supplied to a stream analyzing circuit 502. The stream analyzing circuit 502 analyzes the syntax of the original coded stream STOLD, extracts data elements such as vbv-delay, repeat-first-field, and top-field-first, and supplies them to a splice controller 500. The splice controller 500 supplies the data elements related with the original coded stream STOLD to a stream processor 503.



CLAIMS

[Claim(s)]
[Claim 1]A coding stream splicing device comprising:
In a coding stream splicing device which carries out splicing of the 1st coding stream and 2nd coding stream in a splicing point, A stream analysis means to extract an encoding parameter of the 1st coding stream of the above by analyzing syntax of the 1st coding stream of the above.
Based on an encoding parameter of the 1st coding stream of the above obtained by the above-mentioned stream analysis means, So that the 1st coding stream of the above and the 2nd coding stream of the above may be seamlessly connected in the above-mentioned splicing point, A splicing means which changes an encoding parameter of the 2nd coding stream of the above, and carries out splicing of the 1st coding stream of the above, and the 2nd coding stream by which the above-mentioned encoding parameter was changed.

[Claim 2]The coding stream splicing device according to claim 1, wherein an encoding parameter extracted by the above-mentioned stream analysis means is vbv_delay.
[Claim 3]The above-mentioned splicing means a value of vbv_delay of a picture of the beginning behind a splice point in the 2nd coding stream of the above, The coding stream splicing device according to claim 2 rewriting to a value of vbv_delay of a picture of the beginning behind a splice point in the 1st coding stream of the above.
[Claim 4]The above-mentioned splicing means so that a generation bit amount of a picture of the beginning behind a splice point in the 2nd coding stream of the above may turn into bit quantity corresponding to a value of vbv_delay which was rewritten as for the account of the upper, The coding stream splicing device according to claim 3 inserting stuffing bytes in the 2nd coding stream of the above.
[Claim 5]The above-mentioned splicing means data volume of the above-mentioned stuffing

bytes, A generation bit amount of a picture of the beginning behind a splice point in the 1st coding stream of the above, And the coding stream splicing device according to claim 4 calculating based on a generation bit amount of a picture of the beginning behind a splice point in the 2nd coding stream of the above.

[Claim 6]A data occupation rate of a VBV buffer [in / for data volume of the above-mentioned stuffing bytes / in the above-mentioned splicing means / a splice point of the 1st coding stream of the above], The coding stream splicing device according to claim 5 calculating based on a data occupation rate of a VBV buffer in a splice point of the 2nd coding stream of the above.

[Claim 7]The coding stream splicing device according to claim 1, wherein an encoding parameter extracted by the above-mentioned stream analysis means is repeat_first_field.

[Claim 8]The frame structure of a picture in front of a splice point [in / in the above-mentioned splicing means / the 1st coding stream of the above], So that compatibility with the frame structure of a picture behind a splice point in the 2nd coding stream of the above can be taken, A value of repeat_first_field of a picture in front of a splice point in the 1st coding stream of the above, Or the coding stream splicing device according to claim 7 changing a value of repeat_first_field of a picture behind a splice point in the 2nd coding stream of the above.

[Claim 9]The coding stream splicing device according to claim 1, wherein an encoding parameter extracted by the above-mentioned stream analysis means is top_field_first.

[Claim 10]The frame structure of a picture in front of a splice point [in / in the above-mentioned splicing means / the 1st coding stream of the above], So that compatibility with the frame structure of a picture behind a splice point in the 2nd coding stream of the above can be taken, A value of top_field_first of a picture in front of a splice point in the 1st coding stream of the above, Or the coding stream splicing device according to claim 9 changing a value of top_field_first of a picture behind a splice point in the 2nd coding stream of the above.

[Claim 11]A coding stream splicing method comprising:

In a coding stream splicing method which carries out splicing of the 1st coding stream and 2nd coding stream in a splicing point, A stream analysis step which extracts an encoding parameter of the 1st coding stream of the above by analyzing syntax of the 1st coding stream of the above.

Based on an encoding parameter of the 1st coding stream of the above obtained by the above-mentioned stream analysis step, So that the 1st coding stream of the above and the 2nd coding stream of the above may be seamlessly connected in the above-mentioned splicing point, A splicing step which changes an encoding parameter of the 2nd coding stream of the above, and carries out splicing of the 1st coding stream of the above, and the 2nd coding stream by which the above-mentioned encoding parameter was changed.

[Claim 12]A coding stream splicing method according to claim 11, wherein an encoding

parameter extracted by the above-mentioned stream analysis step is vbv_delay.
[Claim 13]The above-mentioned splicing step a value of vbv_delay of a picture of the beginning behind a splice point in the 2nd coding stream of the above, A coding stream splicing method according to claim 12 rewriting to a value of vbv_delay of a picture of the beginning behind a splice point in the 1st coding stream of the above.
[Claim 14]The above-mentioned splicing step so that a generation bit amount of a picture of the beginning behind a splice point in the 2nd coding stream of the above may turn into bit quantity corresponding to a value of vbv_delay which was rewritten as for the account of the upper, A coding stream splicing method according to claim 13 inserting stuffing bytes in the 2nd coding stream of the above.
[Claim 15]The above-mentioned splicing step data volume of the above-mentioned stuffing bytes, A generation bit amount of a picture of the beginning behind a splice point in the 1st coding stream of the above, And a coding stream splicing method according to claim 14 calculating based on a generation bit amount of a picture of the beginning behind a splice point in the 2nd coding stream of the above.
[Claim 16]A data occupation rate of a VBV buffer [in / for data volume of the above-mentioned stuffing bytes / in the above-mentioned splicing step / a splice point of the 1st coding stream of the above], A coding stream splicing method according to claim 15 calculating based on a data occupation rate of a VBV buffer in a splice point of the 2nd coding stream of the above.
[Claim 17]A coding stream splicing method according to claim 11, wherein an encoding parameter extracted by the above-mentioned stream analysis step is repeat_first_field.
[Claim 18]The frame structure of a picture in front of a splice point [in / in the above-mentioned splicing step / the 1st coding stream of the above], So that compatibility with the frame structure of a picture behind a splice point in the 2nd coding stream of the above can be taken, A value of repeat_first_field of a picture in front of a splice point in the 1st coding stream of the above, Or a coding stream splicing method according to claim 17 changing a value of repeat_first_field of a picture behind a splice point in the 2nd coding stream of the above.
[Claim 19]A coding stream splicing method according to claim 11, wherein an encoding parameter extracted by the above-mentioned stream analysis step is top_field_first.
[Claim 20]The frame structure of a picture in front of a splice point [in / in the above-mentioned splicing step / the 1st coding stream of the above], So that compatibility with the frame structure of a picture behind a splice point in the 2nd coding stream of the above can be taken, A value of top_field_first of a picture in front of a splice point in the 1st coding stream of the above, Or a coding stream splicing method according to claim 19 changing a value of top_field_first of a picture behind a splice point in the 2nd coding stream of the above.
[Claim 21]A coding stream generating device comprising:
In a coding stream generating device which generates a spliced coding stream by carrying out

splicing of the 1st coding stream and 2nd coding stream in a splicing point, A stream analysis means to extract an encoding parameter of the 1st coding stream of the above by analyzing syntax of the 1st coding stream of the above.
Based on an encoding parameter of the 1st coding stream of the above obtained by the above-mentioned stream analysis means, So that the 1st coding stream of the above and the 2nd coding stream of the above may be seamlessly connected in the above-mentioned splicing point, A splicing means which changes an encoding parameter of the 2nd coding stream of the above, and carries out splicing of the 1st coding stream of the above, and the 2nd coding stream by which the above-mentioned encoding parameter was changed.

[Claim 22]A coding stream generation method comprising:
In a coding stream generation method which generates a spliced coding stream by carrying out splicing of the 1st coding stream and 2nd coding stream in a splicing point, A stream analysis step which extracts an encoding parameter of the 1st coding stream of the above by analyzing syntax of the 1st coding stream of the above.
Based on an encoding parameter of the 1st coding stream of the above obtained by the above-mentioned stream analysis step, So that the 1st coding stream of the above and the 2nd coding stream of the above may be seamlessly connected in the above-mentioned splicing point, A splicing step which changes an encoding parameter of the 2nd coding stream of the above, and carries out splicing of the 1st coding stream of the above, and the 2nd coding stream by which the above-mentioned encoding parameter was changed.

[Claim 23]An information processor comprising:
A reception means which receives data.
An exchange means to replace with other data some data received by the above-mentioned reception means.
An encoding means which codes data besides the above.
An alteration means which changes data received by the above-mentioned reception means so that data besides the above and consistency can be taken.

[Claim 24]The information processor according to claim 23 making a value of top_field_first in data which received [above-mentioned], and other data, and repeat_field_field into a value determined beforehand.
[Claim 25]The information processor according to claim 24 having further a preserving means which saves data coded by the above-mentioned encoding means.
[Claim 26]The information processor according to claim 25, wherein the above-mentioned preserving means saves data coded by a time basis set up beforehand.

[Claim 27]An information processing method comprising:
A receiving step which receives data.
An exchange step which replaces with other data some data received at the above-mentioned receiving step.
A coding step which codes data besides the above.
A change step which changes data received at the above-mentioned receiving step so that data besides the above and consistency can be taken.

[Translation done.]

TECHNICAL FIELD

[Field of the Invention]A coding stream splicing device and the coding stream splicing method that this invention is used in a digital broadcasting system, Are a coding stream generating device, a coding stream generation method, an information processor, and a method, and especially, A coding stream splicing device and the coding stream splicing method of generating a seamless spliced stream by carrying out splicing of the two coding streams on a stream level, It is related with a coding stream generating device, a coding stream generation method, an information processor, and a method.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]A coding stream splicing device and the coding stream splicing method that this invention is used in a digital broadcasting system, Are a coding stream generating device, a coding stream generation method, an information processor, and a method, and especially, A coding stream splicing device and the coding stream splicing method of generating a seamless spliced stream by carrying out splicing of the two coding streams on a stream level, It is related with a coding stream generating device, a coding stream generation method, an information processor, and a method.
[0002]
[Description of the Prior Art]Drawing 1 is a figure for explaining the present television broadcasting system. In the present television broadcasting system, the broadcasting station for distributing a TV program to each home, It comprises two or more local stations (branch office) SA, SB, and SC of the head office series which creates head office (key station or main station) SK which makes the TV program of a nationwide scale, and a TV program peculiar to rural areas. Head office SK creates a TV program common to the whole country, and are the created TV program a broadcasting station for transmitting to a local station, and a local station, It is a broadcasting station for distributing the program of both the original TV program sent by transmission between offices from the head office, and the TV program which edited the original TV program part for district characteristic to a local home. For example, as shown in drawing 1, the local station EA, It is an office which creates the TV program transmitted to the home in the broadcasting areas EA, local station EB is an office which creates the TV program transmitted to the home in broadcasting-areas EB, and local station EC is an office which creates the TV program transmitted to the home in broadcasting-areas EC. The editing processing performed in each of this local station is processing which inserts the program of a

weather report original with rural areas in the news program sent from the head office, for example, or inserts rural-areas-oriented commercials in programs, such as a movie and a drama.

[0003]Drawing 2 is the editing processing in each local station a figure for explaining, and drawing 2 (A), Original TV program PGOLD made at the head office is shown, drawing 2 (B) is substitution TV program PGNEW for the districts made in the local station, and drawing 2 (C) shows TV program PGEDIT edited in the local station. The inside of the original TV program to which the example of the editing processing shown in drawing 2 has been transmitted from the head office, commercials -- CM -- one -- a program -- two -- and -- commercials -- CM -- three -- a local station -- setting -- a district -- **** -- making -- having had -- commercials -- CM -- one -- ' -- a program -- two -- ' -- and -- commercials -- CM -- three -- ' -- replacing -- editing processing -- an example -- it is . As a result of the editing processing in this local station, as shown in drawing 2 (C), The TV program for the districts where the TV program (the program 1, CM2, program 3C, and program 4) generated at the head office and the TV program (commercial CM1', program 2' and commercial M3') generated in the local station are intermingled is generated.

[0004]In recent years, since the present television broadcasting system is analog broadcasting which distributes the television signal of the baseband of an analog to each home, the trial in which these analog method systems will be transposed to the broadcasting system of the next generation which uses digital technique is made. This digital broadcasting system carries out compression encoding of a video data or the audio information using compression encoding art, such as MPEG 2 (Moving PictureExperts Group Phase2), It is a system which transmits the coded stream to each home or an other station using a terrestrial wave or a satellite wave. In the broadcast art especially proposed as this digital broadcasting system, The DVB (Digital Video Broadcasting) standard proposed as a next-generation broadcasting format in Europe is the most leading, and this DVB standard is becoming de facto SUTAN dirt.

[0005]Next, the program which contained a video data and audio information using the MPEG standard with reference to drawing 3 is explained about the common digital transmission system transmitted to a receiving system from a transmitting side system.

[0006]In a common digital transmission system, the transmission side system 10, It had MPEG video encoder 11, MPEG audio encoder 12, and the multiplexer 13, and the receiving system 20 is provided with the demultiplexer 21, MPEG video encoder 22, and MPEG audio decoders.

[0007]MPEG video encoder 11 codes the source video data V of baseband based on an MPEG standard, and outputs the coded stream as the video elementalist ream ES. MPEG audio encoder 12 codes the sauce audio information A of baseband based on an MPEG standard, and outputs the coded stream as the audio elementalist ream ES. The multiplexer 13

from MPEG video encoder 11 and MPEG audio encoder 12. A video elementary stream and audio elementalist ream are received, respectively, Those streams are changed into the gestalt of a transport stream packet, and the transport stream packet having contained video elementalist ream and the transport stream packet having contained audio elementalist ream are generated. The multiplexer 13 so that the transport stream packet having contained video elementalist ream and the transport stream packet having contained audio elementalist ream may be intermingled, Each transport stream packet is multiplexed and the transport stream transmitted to the receiving system 20 is generated.

[0008]The demultiplexer 21 receives the transport stream transmitted via the transmission line, and divides it into the transport stream having contained video elementalist ream and the transport stream packet having contained audio elementalist ream. While the demultiplexer 21 generates a video elementary stream from the transport stream packet having contained video elementalist ream, An audio elementary stream is generated from the transport stream packet having contained audio elementalist ream. MPEG video decoder 22 receives a video elementary stream from the demultiplexer 21, decodes this video elementalist ream based on an MPEG standard, and generates the video data V of baseband. MPEG audio decoders 22 receive an audio elementary stream from the demultiplexer 21, decode this audio elementalist ream based on an MPEG standard, and generate the audio information A of baseband.

[0009]Now, when it is going to transpose the conventional analog broadcasting system to a digital broadcasting system using the art of such a digital transmission system, the video data of the TV program transmitted towards a local station serves as a coding stream by which compression encoding was carried out based on the MPEG 2 standard from the head office. Therefore, in order to perform editing processing for transposing a part of original coding stream transmitted from the head office in the local station to the coding stream made in the local station. Before this editing processing, an end and a coding stream must be decoded and it must return to the video data of baseband. It is because the prediction direction of each picture contained in the coding stream according to an MPEG standard relates to the prediction direction of the picture of order, and mutual, so a coding stream is not connectable in the arbitrary positions on a stream. Supposing it connects two coding streams forcibly, the thing which eye a bond of a coding stream becomes discontinuous and does not do and it becomes impossible to decode correctly will occur.

[0010]Therefore, in order to realize editing processing which was explained in drawing 2. Decoding which carries out end decoding of both the original coding stream supplied from the head office, and the coding stream made for districts, and returns each to the video signal of baseband, The video data of two baseband must be edited and editing processing which generates the edited video data for broadcasting, and coding processing in which code the edited video data again and a coding video stream is generated must be performed. However,

since the coding/decoding processing based on an MPEG standard were not coding/decoding processing reversible 100%, there was a problem that image quality will deteriorate whenever it repeats decoding processing and coding processing.

[0011]So, recent years have come to require the art which makes it possible to edit with the state of a coding stream, without carrying out decoding processing of the supplied coding stream. On the bit stream level coded in this way, it is calling it "splicing" to connect two different encoded bit streams and to generate the connected bit stream, and it is required. That is, splicing means editing and connecting two or more streams with the state of a coding stream.

[0012]However, in order to realize this splicing processing, there are the two following problems.

[0013]First, the 1st problem is explained.

[0014]In the MPEG standard currently used in MPEG video encoder 11 and MPEG video decoder 22 which were mentioned above, the bidirectional prediction-coding method is adopted as a coding mode. In this bidirectional prediction-coding method, coding of three types, the formation of a frame inner code, inter-frame forward direction prediction coding, and bidirectional prediction coding, is performed, and the picture by each coding type, It is called I picture (intra coded picture), P picture (predictive coded picture), and B picture (bidirectionally predictive coded picture), respectively. GOP (Group of Picture) used as the unit of random access is constituted combining each picture of I, P, and B appropriately. Generally, the generated code amount of each picture has most I pictures, then there are many P pictures, and there are few B pictures.

[0015]In the encoding method from which a bit yield differs for every picture like an MPEG standard. In order to decrypt correctly the encoded bit streams (only henceforth a stream) obtained in a video decoder and to acquire a picture, the data occupation rate in the input buffer in the video decoder 22 must be grasped with the video encoder 11. So, in an MPEG standard, the virtual buffer a 'VBV (Video Buffering Verifier) buffer' is assumed as a buffer corresponding to the input buffer in the video decoder 22, the video encoder 11 -- a VBV buffer -- a breakdown, i.e., an underflow, -- it is defined as performing coding processing so that it may not be made to overflow. For example, the capacity of this VBV buffer is decided according to the standard of the signal transmitted.

If it is a case of the standard video signal of a main profile main level (MP@ML), it has 1.75M bit capacity.

the video encoder 11 -- this VBV buffer -- overflow -- the bit yield of each picture is controlled not to carry out an underflow.

[0016]Next, a VBV buffer is explained with reference to drawing 4.

[0017]The original stream STOLD which coded the original TV program having contained the

program 1 by which drawing 4 (A) was made at the head office, and commercial CM1 with the video encoder. It is a figure showing the locus of the data occupation rate of the VBV buffer corresponding to the original stream STOLD. Commercial CM1' which drawing 4 (B) is the commercials made for districts, and is substituted for the portion of commercial CM1 of an original TV program, It is a figure showing the locus of the data occupation rate of the VBV buffer of the substitution stream STNEW coded with the video encoder of the local station, and its substitution stream STNEW. Since a part of stream which coded the original TV program transmitted to the branch office from the head office in the following explanation is replaced by the new stream created in the branch office, It is expressed as 'STOLD' which shows that it is an old stream about the original stream which coded this cage JINARUTEBI program, and the substitution stream newly substituted for a part of original stream STOLD is expressed as 'STNEW'. The spliced stream STSPL (spliced stream) obtained by substituting drawing 4 (C) to the original stream STOLD in splice point SP, and carrying out splicing of the stream STNEW. It is a figure showing the locus of the data occupation rate of the VBV buffer of the spliced stream STSPL.

[0018]In drawing 4, in the locus of the data occupation rate of a VBV buffer, an upward-slant-to-the-right portion (inclination portion) expresses a transmission bit rate, and the portion which has fallen vertically expresses the bit quantity which a video decoder pulls out from decoder buffers for reproduction of each picture. The timing to which a video decoder pulls out a bit from these decoder buffers is specified using the information called a decoding time stamp (DTS). In drawing 4, I, P, and B express I picture, P picture, and B picture, respectively.

[0019]Since original coding stream STOLD is the stream by which the video encoder coding of the head office was carried out and the substitution stream STNEW is a stream coded with the video encoder of the local station, It substitutes for original coding stream STOLD, and the stream STNEW is a stream coded completely unrelated with each video encoder. Therefore, since the video encoder of the local station is performing coding processing for completely generating the substitution stream STNEW for the locus of the data occupation rate of the VBV buffer of the video encoder of the head office uniquely to not knowing, It will differ from data occupation rate VBVOLD of the VBV buffer of the original stream STOLD in splice point SP, and data occupation rate VBVNEW of the VBV buffer of the substitution stream STNEW in splice point SP.

[0020]That is, in order to keep the locus of the data occupation rate of a VBV buffer from becoming discontinuous before and behind splice point SP of the spliced stream STSPL. The init level of the data occupation rate of the VBV buffer of the substitution stream STNEW in the spliced stream STSPL must be set to data occupation rate VBVOLD of a VBV buffer. As a result, as shown in drawing 4, rather than data occupation rate VBVOLD of the VBV buffer of the original stream STOLD. When the value of data occupation rate VBVNEW of the VBV

buffer of the substitution stream STNEW is small, a VBV buffer will overflow in the portion of the substitution stream STNEW in the spliced stream STSPL. Conversely rather than data occupation rate VBVOLD of the VBV buffer of the original stream STOLD. When the value of data occupation rate VBVNEW of the VBV buffer of the substitution stream STNEW is large, a VBV buffer will carry out underflow in the portion of the substitution stream STNEW in the splice stream STSPL.

[0021]Next, the 2nd problem is explained.

[0022]The various data elements and flags which show encoded information are described by the header of the stream coded based on the MPEG standard.
It is made as [decrypt / using these data elements or flags / a coding stream].

[0023]The program 1, the program 2, the program 3, and the program 4 which constitute this editing of the original TV program shown in drawing 2, The television signal of the NTSC system which has the 29.97 Hz (about 30 Hz) frame rate photoed with the video camera etc. may be a signal changed into the television signal from the movie raw material which does not restrict but has a 24 Hz (per second 24 tops) frame rate. Since the processing which changes into the three fields the two fields [in / for the processing which generally changes a 24-Hz movie raw material into a 29.97-Hz television signal in this way / an original raw material] by a predetermined sequence is included, it is called '2:3 pulldown processing'.

[0024]Drawing 5 is a figure for explaining this 2:3 pulldown processing. In drawing 5, T1 to T8 shows the top field of the movie raw material which has the frame frequency of 24 Hz, and B1 to B9 shows the bottom field of the movie raw material which has the frame frequency of 24 Hz. The ellipse and triangle which were shown in drawing 5 show the structure of the frame which comprises a top field and a bottom field.

[0025]In this 2:3 pulldown processing, specifically for the movie raw material (the eight top fields T1-T8 and eight bottom fields B1-B8) which has the frame frequency of 24 Hz. Repeat field B-2' generated by repeating bottom field B-2, Repeat field T4' generated by repeating the top field T4, Processing which inserts four repeat fields of repeat field B6' generated by repeating bottom field B6 and repeat field T8' generated by repeating the top field T8 is performed. As a result, the television signal which has the frame frequency of 29.97 Hz by this 2:3 pulldown processing from the movie raw material which has the frame frequency of 24 Hz is generated.

[0026]In an MPEG encoder, after coding processing of the television signal by which 2:3 pulldown processing was carried out is not carried out as it is in a video encoder but removing a repeat field from the television signal by which 2:3 pulldown processing was carried out, a coding place is performed. drawing 5 -- having been shown -- an example -- **** -- 2:3 -- pulldown -- carrying out -- having had -- a television signal -- from -- a repeat field -- B-2 -- ' -- T

-- four -- ' -- B6 -- ' -- and -- T -- eight -- ' -- removing -- having . Thus, this repeat field is the redundant field inserted at the time of 2:3 pulldown processing, and the reason for removing a repeat field before coding processing is that image quality deterioration does not occur at all even if it deletes in order to raise compression encoding efficiency.

[0027]By repeating one field of the two fields which constitute a frame in an MPEG standard, when decoding a coding stream, It defines describing the flag 'repeat_first_field' which shows whether a repeat field is generated. When an MPEG decoder decodes a coding stream, specifically, When the flag "repeat_first_field" in a coding stream is "1", a repeat field is generated, and when the flag "repeat_first_field" in a coding stream is "0", processing in which a repeat field is not generated is performed.

[0028]"repeat_first_field" of the stream which coded the frame which comprises the top field T1 and the bottom field B1 in the case of the example shown in drawing 5 is "0", "repeat_first_field" of the stream which coded the frame which comprises the top field T2 and bottom field B-2 is "1", "repeat_first_field" of the stream which coded the frame which comprises top field T3 and the bottom field B3 is "0", Since "repeat_first_field" of the stream which coded the frame which comprises the top field T4 and bottom field B4 is "1", When decoding the coding stream of the frame which comprises the top field T2 and bottom field B-2, Repeat field B-2' is generated, and when decoding the coding stream of the frame which comprises the top field T4 and bottom field B4, processing which generates repeat field B4' is performed.

[0029]In an MPEG standard, it defines that the first field describes the flag 'top_field_first' which shows a top field or a bottom field, in a coding stream between the two fields which constitute a frame. When "top_field_first" is "1", specifically, It is shown that a top field is the early frame structure in time than a bottom field, and when "top_field_first" is "0", it is shown that a top field is the early frame structure in time than a bottom field.

[0030]"top_field_first" of the coding stream of the frame which comprises the top field T1 and the bottom field B1 in the example shown in drawing 5 is "0", "top_field_first" of the coding stream of the frame which comprises the top field T2 and bottom field B-2 is "1", "top_field_first" of the coding stream of the frame which comprises top field T3 and the bottom field B3 is "0", "top_field_first" of the coding stream of the frame which comprises the top field T4 and bottom field B4 is "1."

[0031]Next, with reference to drawing 6, the problem generated about the flag defined in MPEG standards, such as "top_field_first" when splicing processing of the coding stream is carried out, and "repeat_first_field", is explained.

[0032]Drawing 6 (A) is a shown figure the frame structure of the original stream STOLD which coded the original TV program made at the head office, and drawing 5 (B), It is the figure showing the frame structure of the substitution stream STNEW which coded commercial C1'

for the districts made in the local station, and drawing 5 (C) is the figure showing the frame structure of the spliced stream STSPL by which splicing processing was carried out.
[0033]The program 1 and the program 2 in the original stream STOLD, It is the coding stream by which both 2:3 pulldown processings were carried out, and each frame of commercial CM1 of this editing is a coding stream of the frame structure from which "top_field_first" is "0." District commercial CM1' shown in drawing 6 (B) is a coding stream substituted for the portion of commercial CM1 of an original TV program, and is a coding stream of the frame structure from which "top_field_first" is "1." The spliced stream STSPL shown in drawing 6 (C). The splice of the substitution stream STNEW is carried out after the original stream STOLD shown by the program 1, It is the stream generated by carrying out the splice of the original stream STOLD shown by the program 2 after the substitution stream STNEW. That is, the spliced stream STSPL is a stream which inserted district commercial CM1' instead of this editing commercial CM1 of the original stream STOLD.
[0034]Each frame of commercial CM1 made at the head office shown in drawing 6, top_field_first is a coding stream of the frame structure of "0", and commercial CM1' made in the local station shows that top_field_first is a coding stream of the frame structure of "1."
[0035]As shown in drawing 6 (A) and drawing 6 (B), the frame structure of commercial CM1, When the frame structure of substitution commercial CM1' substituted to commercial CM1 differs, by splice point SP1 of the original stream SPOLD. If the splice of the stream of commercial CM1' is carried out after the stream of the program 1, the gap of the field will arise in the spliced stream STSPL. Bottom field B6 in splice point SP1 drops out of the spliced stream STSPL, and the gap of the field means that the repeated pattern of a top field and a bottom field is discontinuous, as shown in drawing 6 (C).
[0036]Thus, the coding stream to which the gap of the field arises and the field pattern is discontinuous is a coding stream of violation of an MPEG standard, and cannot be normally decrypted by the usual MPEG decoder.
[0037]As shown in drawing 6 (A) and drawing 6 (B), by splice point SP2 of the original stream SPOLD. If the splice of the stream of the program 2 is carried out after the stream of commercial CM1', duplication of the field will arise and carry out in the spliced stream STSPL. As shown in drawing 6 (C), the bottom field b12 and the bottom field B12 in splice point SP2 mean existing in the same display time as duplication of this field.
[0038]Thus, the coding stream to which duplication of the field arises and the field pattern is discontinuous is a coding stream of violation of an MPEG standard, and cannot be normally decrypted by the usual MPEG decoder.
[0039]That is, when SUPURASHINGU processing was performed simply, the field pattern / frame pattern became discontinuous, and the spliced stream according to an MPEG standard was not able to be generated.

[0040]
[Problem(s) to be Solved by the Invention]The purpose of this invention is to provide the coding stream splicing device for realizing seamless splicing processing which the locus of the data occupation rate of the VBV buffer of the stream by which splicing was carried out is continuation, and does not carry out VBV buffer ******. It is in providing a coding stream splicing device for the stream structure of the coding stream before and behind a splicing point to realize seamless splicing processing which does not become discontinuous.
[0041]
[Means for Solving the Problem]The coding stream splicing device according to claim 1, A stream analysis means to extract an encoding parameter of the 1st coding stream by analyzing syntax of the 1st coding stream, Based on an encoding parameter of the 1st coding stream obtained by a stream analysis means, so that the 1st coding stream and 2nd coding stream may be seamlessly connected in a splicing point, An encoding parameter of the 2nd coding stream was changed and it had a splicing means which carries out splicing of the 1st coding stream and the 2nd coding stream by which an encoding parameter was changed.
[0042]A coding stream splicing method according to claim 11, A stream analysis step which extracts an encoding parameter of the 1st coding stream by analyzing syntax of the 1st coding stream, Based on an encoding parameter of the 1st coding stream obtained by a stream analysis step, so that the 1st coding stream and 2nd coding stream may be seamlessly connected in a splicing point, An encoding parameter of the 2nd coding stream was changed and it had a splicing step which carries out splicing of the 1st coding stream and the 2nd coding stream by which an encoding parameter was changed.
[0043]The coding stream generating device according to claim 21, A stream analysis means to extract an encoding parameter of the 1st coding stream by analyzing syntax of the 1st coding stream, Based on an encoding parameter of the 1st coding stream obtained by a stream analysis means, so that the 1st coding stream and 2nd coding stream may be seamlessly connected in a splicing point, An encoding parameter of the 2nd coding stream was changed and it had a splicing means which carries out splicing of the 1st coding stream and the 2nd coding stream by which an encoding parameter was changed.
[0044]The coding stream generation method according to claim 22, A stream analysis step which extracts an encoding parameter of the 1st coding stream by analyzing syntax of the 1st coding stream, Based on an encoding parameter of the 1st coding stream obtained by a stream analysis step, so that the 1st coding stream and 2nd coding stream may be seamlessly connected in a splicing point, An encoding parameter of the 2nd coding stream was changed and it had a splicing step which carries out splicing of the 1st coding stream and the 2nd coding stream by which an encoding parameter was changed.
[0045]written this invention is characterized by it having been alike and comprising the

following at claim 23.
A reception means which receives data.
An exchange means to replace with other data some data received by a reception means.
An encoding means which codes other data.
An alteration means which changes data received by a reception means so that other data and consistency can be taken.

[0046]written this invention is characterized by it having been alike and comprising the following at claim 27.
A receiving step which receives data.
An exchange step which replaces with other data some data received at a receiving step.
A coding step which codes other data.
A change step which changes data received at a receiving step so that other data and consistency can be taken.

[0047]In a coding stream splicing device of claim 1, and a coding stream generating device of claim 21, A stream analysis means to extract an encoding parameter of the 1st coding stream by analyzing syntax of the 1st coding stream, Based on an encoding parameter of the 1st coding stream obtained by a stream analysis means, so that the 1st coding stream and 2nd coding stream may be seamlessly connected in a splicing point, By changing an encoding parameter of the 2nd coding stream and having a splicing means which carries out splicing of the 1st coding stream and the 2nd coding stream by which an encoding parameter was changed, Seamless splicing processing which a locus of a data occupation rate of a VBV buffer of a stream by which splicing was carried out is continuation, and does not carry out VBV buffer ****** is realizable. According to this invention, stream structure of a coding stream before and behind a splicing point can realize splicing processing which can generate a seamless stream which was able to take compatibility which does not become discontinuous.
[0048]In a coding stream splicing method of claim 11, and a coding stream generation method of claim 22, A stream analysis step which extracts an encoding parameter of the 1st coding stream by analyzing syntax of the 1st coding stream, Based on an encoding parameter of the 1st coding stream obtained by a stream analysis step, so that the 1st coding stream and 2nd coding stream may be seamlessly connected in a splicing point, By changing an encoding parameter of the 2nd coding stream and performing a splicing step which carries out splicing of the 1st coding stream and the 2nd coding stream by which an encoding parameter was changed, Seamless splicing processing which a locus of a data occupation rate of a VBV buffer of a stream by which splicing was carried out is continuation, and does not carry out VBV buffer ****** is realizable. According to this invention, stream structure of a coding stream

before and behind a splicing point can realize splicing processing which can generate a seamless stream which was able to take compatibility which does not become discontinuous.
[0049]In an information processor of claim 23, and an information processing method of claim 27, data is received, some received data is replaced with other data, other data is coded, and received data is changed so that other data and consistency can be taken.
[0050]
[Embodiment of the Invention]Drawing 7 is a figure showing composition for the digital broadcasting system containing the coding stream splicing device concerning an embodiment of the invention.
[0051]Generally the digital broadcasting system comprises the main station (Keystation) 30 and the local station 40 of this main station series as shown in drawing 7.
[0052]To the local station of a series, the main station 30 is a common television program a broadcasting station for making and transmitting, and The broadcast system controller 31, It comprises the raw material server 32, the CM server 33, the matrix switcher block 34, the MPEG encoder block 35, the multiplexer 36, and the modulation circuit 37.
[0053]The broadcast system controller 31, It is a system which manages and controls all the devices and circuits which are established in the broadcasting station of the raw material server 32, the CM server 33, the matrix switcher block 34, the MPEG encoder block 35, the multiplexer 36, and the modulation circuit 37 grade integrative. The programming table for this broadcast system controller 31 to manage the televising time of all raw materials, such as program materials created by the program materials and the promotion raw material which were supplied from the program supplier, or the local station, and CM raw material, is registered, The program organization system 1 controls each device and circuit which were mentioned above according to this programming table. This programming table comprises an event information file on which the program schedule of one time basis or an one-day unit is recorded, an operation information file on which the time schedule of the program of 15 second bits is recorded, etc., for example.
[0054]The raw material server 32 stores the video data and audio information which are broadcast as this editing of a TV program, such as a movie program, a sports program, an entertainment program, and a news program, and. It is a server for outputting the program specified by the broadcast system controller 31 to the timing according to the time schedule of the programming table. This movie program is the video data changed into the television signal which has the frame frequency of 30 Hz by carrying out 2:3 pulldown processing from the film stock which has the frame frequency of 24 Hz, as explained previously. The video data and audio information which were outputted as a program of this editing from this raw material server 32 are supplied to the matrix switcher block 34. For example, in the example shown in drawing 2, the program 1, the program 2, the program 3, and the program 4 grade are

recorded on this raw material server 32. The video data and audio information which are memorized by this raw material server 32 are the video data and audio information of baseband by which compression encoding is not carried out.

[0055]The CM server 33 stores the commercials inserted between the programs edited by the book reproduced from the raw material server 32, and it is a server for outputting the commercials specified by the broadcast system controller 31 to the timing according to the time schedule of the programming table. The video data and audio information which were outputted as commercials from this CM server 33 are supplied to the matrix switcher 34. For example, in the example shown in drawing 2, commercial CM1, commercial CM2, and commercial CM3 grade are recorded on this CM server 33. The video data and audio information which are memorized by this CM server 33 are the video data and audio information of baseband by which compression encoding is not carried out.

[0056]The matrix switcher block 34 has a matrix circuit which carries out routing of live programs, such as a sport relay broadcast and a news program, this editing program outputted from the raw material server 32, and the commercial program outputted from the CM server 33, respectively. The matrix switcher block 34, It has a switching circuit which connects and switches this editing program supplied from the raw material server 32, and the commercial program supplied from the CM server 33 to the timing according to the time schedule of the programming table determined by the broadcast system controller. By this switching circuit, transmission program PGOLD shown, for example in drawing 2 is generable by switching this editing program and CM program.

[0057]The MPEG encoder block 35 is a block for coding the video data and audio information of baseband which were outputted from the matrix switcher block based on an MPEG 2 standard, and has two or more video encoders and audio encoders.

[0058]The multiplexer 36 multiplexes the transport stream of nine channels outputted from the MPEG encoder block 35, and generates one multiplexing transport stream. Therefore, in the multiplexing transport stream outputted. The transport stream packet having contained the coding video elementary stream up to one to nine channels, and the transport stream packet having contained the coding audio elementary stream from one channel to nine channels. It is the stream which is ******(ing).

[0059]The modulation circuit 37 carries out QPSK modulation of the transport stream, and transmits the modulated data to the local station 40 and the home 61 via a transmission line.

[0060]Next, the entire configuration of the local station 40 is explained with reference to drawing 7.

[0061]The local station 40 has the following.

TV program ** which edited the sent common television program for districts, and was edited for districts from the head office -- each home -- televising -- it is a broadcasting station of dried

cuttlefish -- the broadcasting system coat roller 41.
Demodulator circuit 42.
Demultiplexer 43.
The stream conversion circuit 44, the raw material server 46, the CM server 47, the encoder block 48, the stream server 49, the stream splicer 50, the stream conversion circuit 51, the multiplexer 52, and the modulation circuit 53.

[0062]The broadcast system controller 41 like the broadcast system controller 31 of the head office 30, The demodulator circuit 42, the demultiplexer 43, the stream conversion circuit 44, the raw material server 46, the CM server 47, the encoder block 48, the stream server 49, the stream splicer 50, the stream conversion circuit 51, the multiplexer 52, It is a system which manages and controls all the devices and circuits which are established in the local station of the modulation circuit 53 grade integrative. As opposed to the transmission program which was supplied from the head office 30 like the broadcast system controller 31 in the head office 30 as for this broadcast system controller 41, The programming table for managing the televising time of the edit TV program which inserted the program created by the local station, CM, etc. is registered, and each device and circuit which were mentioned above are controlled according to this programming table.
[0063]The demodulator circuit 42 generates a transport stream by carrying out QPSK demodulation of transmission PIROGURAMU transmitted from the head office 30 via the transmission line.
[0064]The demultiplexer 43 carries out false rumor RUCHIPU REXX of the tolan SUPO toss ream outputted from the demodulator circuit 42, generates the transport stream of nine channels, and outputs the transport stream of each channel to the stream conversion circuit 44. That is, this demultiplexer 43 performs processing that the multiplexer 36 of the head office 30 is reverse.
[0065]The stream conversion circuit 44 is a circuit for changing into the gestalt of an elementary stream the transport stream supplied from the demultiplexer 43.
[0066]The raw material server 46 is a server which stores the video data and audio information which are broadcast as a rural-areas-oriented TV program, such as an entertainment program and a news program. The CM server 47 is a server for storing the video data and audio information of the commercials for districts which are inserted between these editing programs supplied from the head office 30. The video data and audio information which are memorized by this raw material server 46 and the CM server 47 are the video data and audio information of baseband by which compression encoding is not carried out.
[0067]The encoder block 48 is a block for coding the video data of two or more channels supplied from the raw material server 46 and the CM server 47, and two or more Chillan El's

audio information, It has two or more video encoder and two or more audio encoders corresponding to two or more channels. The difference between this encoder block 48 and the MPEG encoder block 35 of the head office 30, Although the MPEG encoder blocks 35 of the head office 30 differ to outputting a transport stream in that the elementary stream I/O of the encoder block 48 of this local station 40 is carried out, The substantial function and processing of this encoder block 48 are completely the same as the MPEG encoder block 35 of the head office 30. The elementary stream for three channels is supplied to the stream server 49 among the elementary streams of two or more channels outputted from the encoder block 48, and the elementary stream of the remaining channels is supplied to the stream splicer 50.

[0068]The stream server 49 receives the elementary stream for three channels supplied from the encoder block, and record on the recording medium in which random access is possible in the state of a stream in the state of a stream, and. following the control from the broadcast system controller 41 -- the elementary stream -- run DAMUA -- it reproduces from the recording medium in which sex is possible.

[0069]The stream splicer 50 carries out routing of two or more EREMENTA leases supplied from the encoder block 48 and the stream server 49, and outputs them to a predetermined output line, and. It is the block for carrying out splicing of the elementary stream supplied from the head office 30, and the elementary stream generated in the local station 40 on a stream level. The processing in this stream splicer 50 is mentioned later in detail.

[0070]The stream conversion circuit 51 is a circuit which receives the elementary stream outputted as a spliced stream from the stream splicer 50, and changes this elementary stream into a transport stream.

[0071]The multiplexer 52 multiplexes the transport stream of nine channels outputted from the stream conversion circuit like the multiplexer 36 of the head office 30, and generates one multiplexing transport stream.

[0072]The modulation circuit 53 carries out QPSK modulation of the transport stream, and distributes the modulated data to each home 62 via a transmission line.

[0073]Drawing 8 is a block diagram for explaining the composition of the MPEG encoder block 35 of the head office 30, and the encoder block 48 of the local station 40 in detail. Since the MPEG encoder block 35 of the head office 30 and the encoder block 48 of the local station 40 are the same composition substantially, the MPEG encoder block 35 of the head office 30 is mentioned as an example, and the composition and yesterday are explained.

[0074]The MPEG encoder block 35 is provided with the following.

The encoder controller 350 for controlling intensively all the circuits of this MPEG encoder block 35.

Two or more MPEG video encoder 351-1V for encoding supplied video data of two or more channels - 351-9V.

MPEG audio encoder 351-1A for coding two or more audio information which corresponds to a video data, respectively based on an MPEG 2 standard - 351-9A.

[0075]The MPEG encoder block 35, Stream conversion circuit 352-1V which changes into transport stream coding elementary stream (ES) outputted, respectively from each video encoder 351-1V - 351-9V - 352-9V, Stream conversion circuit 352-1A which changes into a transport stream the coding elementary stream (ES) outputted, respectively from each audio encoder 351-1A - 351-9A - 352-9A, The transport stream having contained the video elementary stream of the 1st channel (1ch), The multiplexer 353-1 which multiplexes the transport stream having contained the audio elementary stream of the 1st channel (1ch) per transport stream packet, The transport stream having contained the video elementary stream of the 2nd channel (2ch), The multiplexer 353-2 which multiplexes the transport stream having contained the audio elementary stream of the 2nd channel (2ch) per transport stream packet, and ...., The transport stream having contained the video elementary stream of the 9th channel (9ch), It has the multiplexer 353-9 which multiplexes the transport stream having contained the audio elementary stream of the 9th channel (9ch) per transport stream packet.
[0076]Although the MPEG encoder block 35 shown in drawing 8 has composition which encodes the transmission program of nine channels, it cannot be overemphasized that not only nine channels but it may be what channel.
[0077]The MPEG encoder block 35 shown in drawing 8 performs control called statistics multiplex [to which the transmission rate of the transmission program of each channel is dynamically changed according to the pattern of the video data to code]. The technique of this statistics multiplex is comparatively simple for the pattern of the picture of the transmission program of a certain channel, It is a case where so many bits are not needed in order to code this picture, in order that the pattern of the picture of other programs may be comparatively difficult and may code this picture on the other hand -- many bits -- necessity -- **, when like, It is the method of carrying out which will make the transmission rate of a transmission line efficient by assigning the bit for coding the picture of a certain chain flannel to the bit which codes the picture of other channels. How to change the encoding rate of each video encoder to below dynamically in this way is explained briefly.
[0078]Each video encoder 351-1V - 351-9V, First, from statistics values obtained as a result of the motion compensation performed before coding processing, such as the motion compensation remainder and Intra AC. Difficulty data (Difficulty Data) D1 which shows how much bit quantity is required in order to code the picture used as a coding subject - D9 are generated. This difficulty data is information which shows coding hardness, It expresses that that a difficulty is large has a complicated pattern of the picture used as a coding subject, and expresses that it is simple for the pattern of the picture used as a coding subject for a difficulty

to be small. This difficulty data can be estimated based on statistics values used at the time of the coding processing in a video encoder, such as Intra AC and the motion compensation remainder (ME remainder).

[0079]The encoder controller 350 receives the difficulty data D1-D9 outputted, respectively from each video encoder 351-1V - 351-9V, Based on those difficulty data D1-D9, the target bit rates R1-R9 to each video encoder 351-1V - 351-9V are calculated, respectively. As shown in the following formulas (1), specifically, the encoder controller 350 can ask for the target bit rates R1-R9 by distributing total transmission rate Total_Rate of a transmission line proportionally using the difficulty data D1-D9.

Ri = (Di/ sigma Dk) x Total_Rate ... (1)

[0080]"Ri" in a formula (1) The target bit rate of the transmission program of the "i" channel, Difficulty data for "Di" to code the picture of the transmission program of the "i" channel and "sigma" mean total of the difficulty data of k= 1-9 channels.

[0081]The encoder controller 350 supplies the target bit rates R1-R9 calculated based on the formula (1) to corresponding, respectively video encoder 351-1V - 351-9V. The unit which calculates these target bit rates R1-R9 may be every picture, and may be GOP units.

[0082]Video encoder 351-1V - 351-9V receives the target bit rates R1-R9 supplied from the encoder controller 350, respectively, and it performs coding processing so that it may correspond to these target bit rates R1-R9. By changing dynamically the bit rate of the coding stream outputted from each video encoder based on the difficulty data in which the coding hardness of the picture coded in this way is shown, The optimal quantity of a bit can be assigned to the coding hardness of the picture which should be coded, and the total amount of the bit rate outputted from each video encoder, respectively does not overflow total transmission rate Total_Rate of a transmission line further.

[0083]Both stream conversion circuit 352-1V - 352-9V [and], stream conversion circuit 352-1A and - 352-9A are the circuits for changing an elementary stream into a transport stream.

[0084]With reference to drawing 9, code the supplied source video data in video encoder 351-1V, and a video elementary stream is generated, The example which changes the video elementary stream into a transport stream in stream conversion circuit 352-1V is given, and the process in which a transport stream is generated from a video elementary stream is explained.

[0085]Drawing 9 (A) is shown and the source video data supplied to video encoder 351-1V drawing 9 (B), The video elementary stream (ES) outputted from video encoder 351-1V is shown, drawing 9 (C) shows a PAKERRAIZUDO elementary stream (PES), and drawing 9 (D) shows the transport stream (TS).

[0086]Like the stream V1 shown in drawing 9 (B), V2, V3, and V4, the data volume of the elementary stream coded in the MPEG 2 standard differs according to the picture type (I

picture, P picture, or B picture) of a video frame, and the existence of a motion compensation. The PAKETTAIZUDO elementary stream (PES) shown in drawing 9 (C) packet-izes two or more of the elementary streams, and is generated by adding a PES header to the head. For example, 24 which shows the start of a PES packet to this PES header 8 which shows the classification (for example, classification, such as video and a sound) of the stream data accommodated in the packet start code of [bit], and the live-data portion of a PES packet 16 which indicates the length of the data which continues henceforth to be stream ID of [bit] 8 which shows the length of the data of the packet length of [bit], the coded data which shows the value "10", the flag control part in which various flag information is stored, and a conditional coding part The time-of-day-control information at the time of decoding called the PES header length of [bit], and the hour entry of the reproducing output called PTS (Presentation Time Stamp) and DTS (Decoding Time Stamp), Or it is constituted by the variable-length conditional coding part in which the stuffing bytes for data volume adjustment, etc. are stored.

[0087]A transport stream (TS) is a data row of the transport stream packet which comprises 4 bytes of TS header, and the payload part on which 184 bytes of live data are recorded. In order to generate this transport stream packet (TS packet), First, the data stream of a PES packet is decomposed every 184 bytes, 184 bytes of the live data are inserted in the payload part of a TS packet, and a transport stream packet is generated by adding 4 bytes of TS header to data with a pay load [the] of 184 bytes.

[0088]Next, with reference to drawing 17, the syntax and structure of an elementary stream are explained from drawing 10, and the syntax and structure of a transport stream are explained in detail with reference to drawing 19 from drawing 18.

[0089]Drawing 10 is a figure showing the syntax of the video elementary stream of MPEG. Each video encoder 351-1V within the video encoder block 35 - 3519V generates the coding elementary stream according to the syntax shown in this drawing 10. In the syntax explained below, a function and a conditional sentence are expressed with a thin printing type, and the data element is expressed with ******. The data item is described by the mnemonic (Mnemonic) who shows the name, bit length, and its type and transmitting order.

[0090]First, the function currently used in the syntax shown in this drawing 10 is explained. Actually, the syntax shown in this drawing 10 is syntax used in order to extract meaningful predetermined data from the coding stream transmitted to the video decoder side. The syntax used for the video encoder side is the syntax which omitted conditional sentences, such as a part for if, and a while sentence, from the syntax shown in drawing 10.

[0091]The next_start_code() function first described in video_sequesce() is a function for looking for the start code described in the bit stream. The data element defined by the sequence_header() function and the sequence_extension() function is first described by the coding stream generated according to the syntax shown in this drawing 6. This

sequence_header() function, It is a function for defining the header data of the sequence layer of an MPEG bit stream, and a sequence_extension() function is a function for defining the extended data of the sequence layer of an MPEG bit stream.
[0092]The do{}while syntax arranged after the sequence_extension() function, {} of do [while the conditions defined by the while sentence are truth] sentence -- it is the syntax which shows that the data element described based on the inner function is described in an encoding data stream. The nextbits() function currently used for this while sentence is a function for comparing the bit or bit string described in the bit stream with the data element referred to. In the example of the syntax shown in this drawing 6, a nextbits() function, When sequence_end_code which shows the bit string in a bit stream and the end of a video sequence is compared and the bit string and sequence_end_code in a bit stream are not in agreement, the conditions of this while sentence serve as truth. Therefore, the do{}while syntax arranged after the sequence_extension() function, While sequence_end_code which shows the end of a video sequence in a bit stream does not appear, it is shown that the data element defined by the function in do sentence is described in encoded bit streams.
[0093]In encoded bit streams, the data element defined by the extension_and_user_data (0) function is described by the next of each data element defined by the sequence_extension() function. This extension_and_user_data (0) function is a function for defining the extended data and the user datum in a sequence layer of an MPEG bit stream.
[0094]The do{}while syntax arranged after this extension_and_user_data (0) function, {} of do [while the conditions defined by the while sentence are truth] sentence -- the data element described based on the inner function is a function which shows what is described by the bit stream. The nextbits() function currently used in this while sentence, that it is a function for judging coincidence with the bit or bit string which appears in a bit stream, and picture_start_code or group_start_code, When the bit or bit string which appears in a bit stream, and picture_start_code or group_start_code is in agreement, the conditions defined by the while sentence serve as truth. Therefore, when picture_start_code or group_start_code appears in encoded bit streams, this do{}while syntax. It is shown that the code of the data element defined by the function in the start code, next do sentence is described.
[0095]In encoded bit streams, if sentence described by the beginning of this do sentence shows the conditions of the case where group_start_code appears, and is. When it is truth, the conditions by this if sentence in encoded bit streams, The data element defined as the next of this group_start_code by the group_of_picture_header() function and the extension_and_user_data (1) function is described in order.
[0096]This group_of_picture_header() function, It is a function for defining the header data of the GOP layer of an MPEG coding bit stream, and an extension_and_user_data (1) function is a function for defining the extended data and the user datum of a GOP layer of an MPEG

coding bit stream.

[0097]In these encoded bit streams, to the next of the data element defined by the group_of_picture_header() function and the extension_and_user_data (1) function. The data element defined by the picture_header() function and the picture_coding_extension() function is described. Of course, when the conditions of if sentence explained previously do not serve as truth. Since the data element defined by the group_of_picture_header() function and the extension_and_user_data (1) function is not described, To the next of the data element defined by the extension_and_user_data (0) function. The data element defined by the picture_header () function, the picture_coding_extension() function, and the extension_and_user_data (2) function is described.

[0098]This picture_header() function, It is a function for defining the header data of the picture layer of an MPEG coding bit stream, and a picture_coding_extension() function is a function for defining the 1st extended data of the picture layer of an MPEG coding bit stream. An extension_and_user_data (2) function is a function for defining the extended data and the user datum of a picture layer of an MPEG coding bit stream. The user datum defined by this extension_and_user_data (2) function, In [since it is data described by the picture layer and is data which can be described for every picture] this invention, He is trying to describe time code information as an user datum defined by this extension_and_user_data (2) function.

[0099]In encoded bit streams, the data element defined by a picture_data() function is described by the next of the user datum of a picture layer. This picture_data() function is a function for describing the data element about a slice layer and a macro block layer.

[0100]The while sentence described by the next of this picture_data() function is a function for performing conditional judgment of the following if sentence, while the conditions defined by this while sentence are truth. The nextbits() function currently used in this while sentence, It is a function for judging whether picture_start_code or group_start_code is described in encoded bit streams, When picture_start_code or group_start_code is described in the bit stream, the conditions defined by this while sentence serve as truth.

[0101]If it is a conditional sentence for judging whether sequence_end_code is described or not and sequence_end_code is not described in encoded bit streams, the following if sentence, It is shown that the data element defined by the sequence_header() function and the sequence_extension() function is described. Since sequence_end_code is a code which shows the end of the sequence of a coding video stream, Unless a coding stream is completed, in the coding stream, the data element defined by the sequence_header() function and the sequence_extension() function is described.

[0102]The data element described by this sequence_header() function and the sequence_extension() function, It is completely the same as the data element described by the sequence_header() function described at the head of the sequence of a video stream, and the

sequence_extension() function. Thus, the reason for describing the same data in a stream, When reception is started by the bit stream receiving set side from the middle (for example, bit stream portion corresponding to a picture layer) of a data stream, it is for preventing that it becomes impossible to receive the data of a sequence layer, and it becomes impossible to decode a stream.

[0103]The next of the data element defined by the sequence_header() function and sequence_extension() function of this last, That is, 32-bit sequence_end_code which shows the end of a sequence is described by the last of the data stream.

[0104]Below, a sequence_header() function, a sequence_extension() function, An extension_and_user_data (0) function, a group_of_picture_header() function, and an extension_and_user_data (1) function are explained in detail.

[0105]Drawing 11 is a figure for explaining the syntax of a sequence_header() function. The data element defined by this sequence_header() function, sequence_header_code, sequence_header_present_flag, horizontal_size_value, vertical_size_value, aspect_ratio_information, frame_rate_code, bit_rate_value, marker_bit, VBV_buffer_size_value, constrained_parameter_flag, load_intra_quantizer_matrix, They are intra_quantizer_matrix, load_non_intra_quantizer_matrix, non_intra_quantizer_matrix, etc.

[0106]sequence_header_code is data showing the start synchronization code of a sequence layer. sequence_header_present_flag is data in which it is shown whether the data in sequence_header is effective or invalid. horizontal_size_value is data which comprises 12 bits of low ranks of the horizontal pixel number of a picture. vertical_size_value is data which consists of 12 bits of low ranks of the line number of the length of a picture. aspect_ratio_information is data showing the aspect ratio (aspect ratio) or display screen aspect ratio of a pixel. frame_rate_code is data showing the display period of a picture. bit_rate_value is 18 bits (it revalues per 400bsp) of low rank data of the bit rate for the restriction to a generation bit amount. marker_bit is bit data inserted in order to prevent a start code emulation. VBV_buffer_size_value is low rank 10 bit data of the value which determines the size of the virtual buffer for generated code amount control (video buffer verifier). constrained_parameter_flag is data in which it is shown that each parameter is less than restriction. load_intra_quantizer_matrix is data in which existence of the quantizing-matrix data for the intra MB is shown. intra_quantizer_matrix is data in which the value of the quantizing matrix for the intra MB is shown. load_non_intra_quantizer_matrix is data in which existence of the quantizing-matrix data for the non-intra MB is shown. non_intra_quantizer_matrix is data showing the value of the quantizing matrix for the non-intra MB.

[0107]Drawing 12 is a figure for explaining the syntax of a sequence_extension() function. With the data element defined by this sequence_extension() function. extension_start_code, extension_start_code_identifier, sequence_extension_present_flag,

profile_and_level_indication, progressive_sequence, chroma_format, horizontal_size_extension, vertical_size_extension, bit_rate_extension, They are data elements, such as vbv_buffer_size_extension, low_delay, frame_rate_extension_n, and frame_rate_extension_d.

[0108]extension_start_code is data showing the start synchronization code of extension data. extension_start_code_identifier is data in which it is shown which extended data is sent. sequence_extension_present_flag is SUDETA which shows whether the data within a sequence extension is effective or invalid. profile_and_level_indication is data for specifying the profile and level of a video data. progressive_sequence is data in which it is shown that a video data is sequential scanning. chroma_format is data for specifying the color difference format of a video data. horizontal_size_extension is top 2-bit data added to horizntal_size_value of a sequence header. vertical_size_extension is top 2-bit data which is a sequence header and which vertical_size_value adds. bit_rate_extension is top 12-bit data added to bit_rate_value of a sequence header. vbv_buffer_size_extension is top 8-bit data added to vbv_buffer_size_value of a sequence header. low_delay is data in which it is shown that B picture is not included. frame_rate_extension_n is data for obtaining a frame rate combining frame_rate_code of a sequence header. frame_rate_extension_d is data for obtaining a frame rate combining frame_rate_code of a sequence header.

[0109]Drawing 13 is a figure for explaining the syntax of an extension_and_user_data(i) function. The data element by which this extension_and_user_data(i) function is defined by an extension_data() function when "i" is except two describes only the data element defined by a user_data() function, without describing. Therefore, an extension_and_user_data (0) function describes only the data element defined by a user_data() function.

[0110]Drawing 14 is a figure for explaining the syntax of a group_of_picture_header() function. The data element defined by this group_of_picture_header() function, It comprises group_start_code, group_of_picture_header_present_flag, time_code, closed_gop, and broken_link.

[0111]group_start_code is data in which the start synchronization code of a GOP layer is shown. It is data in which it is shown whether the data element in group_of_picture_header_present_flag and group_of_picture_header is effective or invalid. time_code is a time code which shows the time from the head of the sequence of the leading picture of GOP. closed_gop is flag data in which a thing with a picture refreshable independently of other GOP(s) in GOP is shown. broken_link is flag data in which it is shown that B picture of the head in GOP cannot be correctly reproduced because of edit etc.

[0112]It is a function for describing only the data element defined by a user_data() function like an extension_and_user_data (1) function and an extension_and_user_data (0) function.

[0113]Next, the picture_headr() function for describing the data element about the picture layer

of a coding stream with reference to drawing 17 from drawing 15, A picture_coding_extension() function, extensions_and_user_data (2), and picture_data() are explained.

[0114]Drawing 15 is a figure for explaining the syntax of a picture_headr() function. The data element defined by this picture_headr() function, picture_start_code, temporal_reference, picture_coding_type, vbv_delay, full_pel_forward_vector, They are forward_f_code, full_pel_backward_vector, backward_f_code, extra_bit_picture, and extra_information_picture.

[0115]Specifically, picture_start_code is data showing the start synchronization code of a picture layer. temporal_reference is data reset at the head of GOP by the number which shows the display order of a picture. picture_coding_type is data in which a picture type is shown.

[0116]vbv_delay is data in which the initial state of a VBV buffer is shown, and is set up for every picture. The picture of the coding elementary stream transmitted to the receiving system from the transmitting side system, It is buffered by the VBV buffer provided in the receiving system, and it is pulled out from this VBV buffer (read), and a decoder is supplied at the time specified by DTS (Decoding Time Stamp). Since the picture for decryption begins to be buffered by the VBV buffer, the time defined by vbv_delay means the time when the picture of a coding subject is pulled out from a VBV buffer, i.e., the time specified by DTS. In the coding stream splicing device of this invention, it is made to realize data occupation rate VBV buffer seamless splicing which does not become discontinuous by using vbv_delay stored in this picture header. It mentions later in detail.

[0117]full_pel_forward_vector is data which the accuracy of a forward direction motion vector shows an integer unit or a half a pixel unit. forward_f_code is data showing a forward direction motion vector search range. full_pel_backward_vector is data which the accuracy of an opposite direction motion vector shows an integer unit or a half a pixel unit. backward_f_code is data showing an opposite direction motion vector search range. extra_bit_picture is a flag which shows existence of the additional information which follows. When this extra_bit_picture is "1", extra_information_picture exists next, and when extra_bit_picture is "0", it is shown that there is no data following this. extra_information_picture is the information reserved in the standard.

[0118]Drawing 16 is a figure for explaining the syntax of a picture_coding_extension() function. With the data element defined by this picture_coding_extension() function. extension_start_code, extension_start_code_identifier, f_code [0], [0], f_code [0] and [1], f_code [1], [0], f_code [1], [1], intra_dc_precision, picture_structure, top_field_first, frame_predictive_frame_dct, concealment_motion_vectors, q_scale_type, intra_vlc_format, alternate_scan, repeat_firt_field, chroma_420_type, It comprises progressive_frame, composite_display_flag, v_axis, field_sequence, sub_carrier, burst_amplitude, and sub_carrier_phase.

[0119]extension_start_code is a start code which shows the start of the extension data of a

picture layer. extension_start_code_identifier is a code which shows which extended data is sent. f_code [0] and [0] are data showing the level motion vector search range of the direction of FOADO. f_code [0] and [1] are data showing the vertical motion vector search range of the direction of FOADO. f_code [1] and [0] are data showing the level motion vector search range of the backward direction. f_code [1] and [1] are data showing the vertical motion vector search range of the backward direction. intra_dc_precision is data showing the accuracy of a DC coefficient. picture_structure is data in which a frame structure or a field structure is shown. In the case of a field structure, they are the higher rank field, the low rank field, or data set and shown.

[0120]top_field_first is a flag which shows whether the first field is a top field and whether it is a bottom field in the case of a frame structure. frame_predictive_frame_dct is data in which it is shown in the case of a frame structure that prediction of frame mode DCT is only a frame mode. concealment_motion_vectors is data in which it is shown that the motion vector for concealing a transmission error is attached to the Intra macro block. q_scale_type is data in which it is shown whether a linear quantization scale is used or a nonlinear quantization scale is used. intra_vlc_format is data in which it is shown whether another two-dimensional VLC is used for the Intra macro block. alternate_scan is data showing selection of whether a zigzag scan is used or to use an alternate scan.

[0121]In [are a flag which shows whether repeat_first_field generates a repeat field at the time of decryption, and] the processing at the time of decryption, When repeat_first_field is "1", a repeat field is generated, and when repeat_first_field is "0", processing in which a repeat field is not generated is performed. When the signal format of chroma_420_type is 4:2:0, they are the same value as following progressive_frame, and data which expresses 0 when that is not right. progressive_frame is data in which it is shown whether this picture can be scanned sequentially. composite_display_flag is data in which it is shown whether the source signal was a composite signal. v_axis is data in which a source signal is used in the case of PAL. field_sequence is data in which a source signal is used in the case of PAL. sub_carrier is data in which a source signal is used in the case of PAL. burst_amplitude is data in which a source signal is used in the case of PAL. sub_carrier_phase is data in which a source signal is used in the case of PAL.

[0122]An extension_and_user_data (2) function, As shown in drawing 13, when extension start code extension_start_code exists in encoded bit streams, the data element defined by an extension_data() function is described. However, it is a extension_data() function when an extension start code does not exist in a bit stream. The data element defined is not described in the bit stream. In the next of the data element defined by this extension_data() function. When user-datum start code user_data_start_code exists in a bit stream, the data element defined by a user_data() function is described.

[0123]Drawing 17 is a figure for explaining the syntax of a picture_data() function. The data element defined by this picture_data() function is a data element defined by a slice() function. However, when slice_start_code which shows the start code of a slice() function does not exist in a bit stream, the data element defined by this slice() function is not described in the bit stream.
[0124]A slice() function is the data element about a slice layer a function for describing, and specifically, slice_start_code, slice_quantiser_scale_code, intra_slice_flag, intra_slice, reserved_bits, It is a function for describing data elements, such as extra_bit_slice, extra_information_slice, and extra_bit_slice, and the data element defined by a macroblock() function.
[0125]slice_start_code is a start code which shows the start of the data element defined by a slice() function. slice_quantiser_scale_code is data in which the quantization step size set up to the macro block which exists in this slice layer is shown. However, when quantiser_scale_code is set up for every macro block, it is used by the data of macroblock_quantiser_scale_code set up to each macro block, giving priority. intra_slice_flag is a flag which shows whether intra_slice and reserved_bits exist in a bit stream. intra_slice is data in which it is shown whether a non Intra macro block exists in a slice layer. When either of the macro blocks in a slice layer is a non Intra macro block, intra_slice is set to "0", and intra_slice is set to "1" when all the macro blocks in a slice layer are non Intra macro blocks. reserved_bits is 7-bit data and takes the value of "0." extra_bit_slice is a flag which shows that additional information exists as a coding stream, and when extra_information_slice next exists, it is set as "1." When additional information does not exist, it is set as "0."
[0126]A macroblock() function is the data element about a macro block layer a function for describing, and specifically, Data elements, such as macroblock_escape, macroblock_address_increment, and macroblock_quantiser_scale_code, They are a macroblock_modes() function and a function for describing the data element defined by macroblock_vecters (s) function.
[0127]macroblock_escape is a fixed bit string which shows whether the horizontal difference of a reference macroblock and a front macro block is 34 or more. When the horizontal difference of a reference macroblock and a front macro block is 34 or more, 33 is added to the value of macroblock_address_increment. macroblock_address_increment is data in which the horizontal difference of a reference macroblock and a front macro block is shown. If one macroblock_escape exists before this macroblock_address_increment, The value which added 33 to the value of this macroblock_address_increment serves as data in which the horizontal difference of a actual reference macroblock and a front macro block is shown. macroblock_quantiser_scale_code is the quantization step size set up for every macro block. Although slice_quantiser_scale_code which shows the quantization step size of a slice layer is

set to each slice layer, When macroblock_quantiser_scale_code is set up to the reference macroblock, this quantization step size is chosen.

[0128]Next, with reference to drawing 18 and drawing 19, the structure of a transport stream packet and the syntax of a transport stream packet are explained in detail.

[0129]The transport stream packet comprises 4 bytes of a header, and 184 bytes of a payload part for storing various kinds of data and data elements.

[0130]The header unit of a transport stream packet, sync_byte, transport_error_indicator, payload_unit_start_indicator, transport_priority, It comprises the various fields, such as PID, transport_scrambling_control, adaptation_field_control, continuity_counter, and adaptation_field.

[0131]sync_byte is the 8-bit field of the immobilization for detecting an alignment pattern out of a bit stream. The value can detect a synchronization by defining as the fixed value of '01000111' (Ox47) and detecting this bit pattern in this stream.

[0132]When transport_error_indicator is set as "1" which is a 1-bit flag, it shows that at least 1-bit bit error which cannot be corrected exists in a transport stream packet.

[0133]payload_unit_start_indicator is a 1-bit flag. It is data which has a normative meaning to the transport stream packet which transmits elementary data or program specification information (PSI), including video/audio information. When the pay load of a transport stream packet contains elementary data, payload_unit_start_indicator has a meaning of the following. When payload_unit_start_indicator is "1", It is shown that elementary data is inserted in the beginning of the pay load of this transport stream packet, When payload_unit_start_indicator is "0", it is shown that elementary data is not inserted in the beginning of the pay load of this transport stream packet. When payload_unit_start_indicator is set to "1", it is shown that only one PES packet begins by arbitrary transport stream packets. On the other hand, when the pay load of a transport stream packet contains PSI data, payload_unit_start_indicator has a meaning of the following. payload_unit_start_indicator is set to "1" when a transport packet transmits the 1st byte of a PSI section. payload_unit_start_indicator is set to "0" when the transport stream packet is not transmitting the 1st byte of a PSI section. payload_unit_start_indicator is set to "0" also when transport stream packets are null packets.

[0134]transport_priority is a 1-bit identifier which shows the priority of a transport packet. If this transport_priority is set as "1", this transport packet is a packet with the same packet identifier PID, and shows that a priority is higher than the packet in which this transport_priority is not "1." For example, a priority can be given in one elementary stream by setting up the packet identifier of this transport_priority at arbitrary packets.

[0135]transport_scrambling_control is 2-bit data in which the scrambling mode of a transport stream packet pay load is shown. Scrambling mode is the mode for the kind of SUKURAMBU [the data stored in the bay load] and its SUKURANGURU to be shown. A transport stream

packet header and the ADABUTESHON field are standardized so that scramble may not be carried out by the scramble key Ks. Therefore, it can be judged whether the scramble of the data stored in the transport stream packet pay load is carried out by this transport_scrambling_control.

[0136]adaptation_field_control is 2-bit data in which it is shown that the adaptation field and/or a pay load come to the packet header of this transport stream. When only payload data are arranged at a packet header, specifically, When this adaptation_field_control is set to "01" and only the adaptation field is arranged at a packet header, This adaptation_field_control is set to "10", and this adaptation_field_control is set to "11" when the adaptation field and a pay load are arranged at a packet header.

[0137]A packet with the same PID to which continuity_counter was transmitted continuously is lack or data to be thrown away and for whether it is **** to be shown in part in the middle of transmission. Specifically, continuity_counter is the 4-bit field which has the same PID and which increases for every transport stream packet. However, when this contimlty_comter counts, it is a case where the ADAMUTESHON field is arranged at the packet header.

[0138]adaptation_field() is the field for inserting additional information, stuffing bytes, etc. about an individual stream as an option. By this adaptation field, all the information about the dynamic change of state of an individual stream can be transmitted together with data.

[0139]Drawing 19 is a figure for explaining the syntax of adaptation_field(). This adaptation_field(), adaptation_field_length, discontinuity_counter, randam_access_indicator, elemntary_stream_priority_indicator, OPCR_flag, splicing_point_flag, transport_private_data_flag, adaptation_field_extension_flag, program_clock_reference (PCR), original_program_clock_reference (OPCR), splice_countdown, transport_private_data_length, private_data, adaptation_field_extension_length, It comprises the various fields, such as ltw_flag (leagal_time_window_flag), piecewise_rate_flag, and seamless_splice_flag.

[0140]adaptation_field_length is data in which the number of bytes of the adaptation field following the next of this adaptation_field_length is shown. When adaptation_field_control is "11", adaptation_field_length is 0 to 182 bits, and adaptation_field_length will be 183 bits when adaptation_field_control is "10." When there is only no elementary stream which fills the pay load of a transport stream, the stuffing processing for filling a bit is needed.

[0141]discontinuity_counter is data in which it is shown whether a system clock reference (SCR) is reset and the system clock reference is discontinuous in the middle of two or more packets which have the same PID. When a system clock reference is discontinuous, this discontinuity_counter is set to "1", and this discontinuity_counter is set to "0" when the system clock reference is continuing. This system clock reference is the reference information for setting it as the timing which meant the value of the system time clock by the side of a decoder to the encoder side in an MPEG decoder for video and an audio to decode.

[0142]randam_access_indicator is data in which the beginning of the sequence header of video or the frame of an audio is shown. That is, this randam_access_indicator is data for that it is an access point (the beginning of a frame) of video or an audio to be shown, when performing the random access of a data element.
[0143]In the packet which has the same PID, elemntary_stream_priority_indicator is data in which the priority of the elementary stream data transmitted in the pay load of this transport stream packet is shown. For example, elemntary_stream_priority_indicator is set to "1" when intra coding of the video data is carried out [the elementary stream] for the video data. elemntary_stream_priority_indicator of the transport stream having contained the video data by which inter encoding is carried out is set to "0" to it.
[0144]PCR_flag is data in which it is shown whether PCR (program_clock_refrence) data exists in the adaptation field, and is **. When PCR data exists in the adaptation field, PCR_flag is set to "1", and PCR_flag is set to "0" when PCR data does not exist. This PCR data is data used in order to obtain the timing of decoding which decodes the transmitted data in the decoder of a receiver end.
[0145]OPCR_flag is data in which it is shown whether OPCR (original_program_clock_refrence) data exists in the adaptation field, and is **. When OPCR data exists in the adaptation field, OPCR_flag is set to "1", and OPCR_flag is set to "0" when OPCR data does not exist. This OPCR data is data used for that when one transport stream is reconstructed from two or more original transport streams by spline SHINGU processing etc., It is data showing the PCR data of a certain original transport stream.
[0146]splicing_point_flag is data in which it is shown whether splice_countdoun for the edit point (splice point) in a transport level to be shown exists in the adaptation field. When splice_countdoun exists in the adaptation field, This splicing_point_flag is "1", and this splicing_point_flag is "0" when splice_countdoun exists in the adaptation field.
[0147]transport_private_data_flag is data for whether the private life for describing arbitrary user data exists in the adaptation field to be shown. When private life exists in the adaptation field, This transport_private_data_flag is set to "1", and this transport_private_data_flag is set to "0" when private life does not exist in the adaptation field.
[0148]adaptation_field_extension_flag is data for whether extended field existence is recognized to be shown in the adaptation field. When an extended field exists in the adaptation field, This adaptation_field_extension_flag is set to "1", and this adaptation_field_extension_flag is set to "0" when an extended field does not exist in the adaptation field.
[0149]program_clock_reference (PCR) is a reference clock referred to when synchronizing the phase of the clock of a receiver end to the phase of the transmitting side and a clock. The time when the transport packet was generated is stored in this PCR data. This PCR is data which comprises 42 bits of 33 bits program_c1 ock_reference_base and 9-bit

program_clocLreference_extension. By the carry at the time of counting the system clock to 0-299, and being reset by program_clocLreference_extension from 299 to 0. By adding 1 bit to program_c1 ock_reference_base, 24 hours is countable.

[0150]original_program_clock_reference (OPCR) is data used when the transport stream of a single program is reconstructed from a certain transport stream. When a single programed lance boat stream is reconstructed thoroughly, this original_program_clock_reference is copied to program_clock_reference.

[0151]splice_countdown is data in which the number of the packets to the point (splicing processing is possible) which can be edited by a transport stream packet level is shown in the transport stream packet of the same PID. Therefore, in the transport stream packet of the splicing point which can be edited, splice_countdown is "0." By the transport packet from which splice_countdown is set to "0", the splicing processing of the last byte of a transport stream packet pay load is attained by considering it as the byte of the last of the coded picture.

[0152]This splicing processing is processing which connects two different elementary streams performed on a transport level, and generates one new transport stream. And it can divide into the seamless splice which does not generate the discontinuity of decoding, and the non seamless splice which causes the discontinuity of decoding as splicing processing. The decoding time of the access unit of the stream newly connected back when the discontinuity of numerals was not generated, it being shown that there is no inconsistency of the decoding time of the access unit of the old stream in front of a splice and a between, and generating the discontinuity of numerals, It is shown to the decoding time of the access unit of the stream connected back newly that inconsistency of the decoding time of the access unit of the old stream in front of a splice arises.

[0153]transport_private_data_length is data in which the number of bytes of the ply date data in the adaptation field is shown.

[0154]private_data is the field which is not prescribed by the standard in particular but can describe arbitrary user data in the adaptation field.

[0155]adaptation_field_extension_length is data in which the data length of the adaptation field extension in the adaptation field is shown.

[0156]ltw_flag (leagal_time_window_flag) is data in which it is shown whether ltw_offset which shows the offset value of a display window in the adaptation field exists.

[0157]piecewise_rate_flag is data in which it is shown whether piecewise_rate exists in the adaptation field.

[0158]seamless_splice_flag is data in which it is shown whether a splicing point is a usual splicing point and seamless splicing point. When this seamless_splice_flag is "0", It is shown that a splicing point is the usual splicing point, and when this seamless_splice_flag is "1", it is shown that a splicing point is a seamless SUPUISHINGU point. The usual splicing point is a

case where a splicing point exists in a pause of a PES packet, It is a case where the transport packet which the splicing packet in front of this splicing point is completed by an access unit, and has the same following PID has begun by the header of a PES packet. With on the other hand, a seamless splicing point. The decoding time of the access unit of the stream which is a case where there is a splicing point in the middle of a PES packet, and was connected back newly, In order to make it there be no inconsistency between the decoding time of the access unit of the old stream in front of a splice, it is a case where a part of old characteristic of a stream is used as the characteristic of a new stream.

[0159]Next, the splicing processing which carries out splicing of the stream STNEW generated in the stream STOLD and the local station 40 which were transmitted from the head office 30, and which came is explained with reference to drawing 23 from drawing 20.

[0160]Drawing 20 is the figure which left two or more channels of only one certain channel, and omitted other channels, in order to explain more nearly plainly control of the local station 40 which explained in drawing 7. In this invention, it has an example about three splicing processings as an example about splicing processing. Below, the example about the 1st, 2nd, and 3rd splicing processings is described in order.

[0161]The example about the 1st splicing processing, Before coding stream STOLD of a transmission program is transmitted from the head office 30, it is an example about the splicing processing performed when coding stream STNEW of commercial CM' inserted newly is already generated. That is, it is a case where it is already beforehand coded by the coding stream STOLD portion of commercial CM in a transmission program, and the stream of commercial CM1' is inserted in it. Usually, since it is broadcast repeatedly, if commercials code the video data of commercials at every time, it is not efficient. Then, the video data of rural-areas-oriented commercial CM1' is coded, and the coding stream TSNEW is beforehand memorized to the stream server 49. And when coding stream STOLD of commercial CM1 replaced from the head office 30 has been transmitted, The processing which codes the same commercials repeatedly can be excluded by reproducing coding stream STNEW of rural-areas-oriented commercial CM1' from this stream server 49. In such a case, 1st splicing processing explained concretely below is performed.

[0162]First, in the local station 40, commercial CM1' for the districts transposed to the portion of commercial CM1 of a transmission program is coded, and the initial processing which stores coding stream STNEW in the stream server 49 is explained. The broadcast system controller 41 controls the CM server 47 to reproduce the video data of commercial CM1' transposed to the portion of commercial CM of a transmission program. And the encoder 481 receives the video data of the baseband reproduced from the CM server 47, and supplies the coding hardness (Difficulty) Di of each picture of this video data to the encoder controller 480. Like the encoder controller 350 explained in drawing 8, the encoder controller 480 supplies the target

bit rate Ri to the encoder 481 so that the encoder 481 may generate a suitable encoded bit. The encoder 481 can generate the coding elementary stream STNEW of the optimal bit rate by performing coding processing based on the target bit rate Ri supplied from the encoder controller 480. The coding elementary stream STNEW outputted from the encoder 481 is supplied to the stream server 49. The stream server 49 records a coding elementary stream on the recording medium in which random access is possible with the state of a stream. The initial processing which stores coding stream STNEW in the stream server 49 now is ended.
[0163]Next, the splicing processing which carries out splicing of coding stream STOLD of the transmission program transmitted from the head office and the coding stream STNEW stored in the stream server 49 by the initial processing mentioned above is explained.
[0164]Transmitted coding stream STOLD is changed into the form of an elementary stream from the form of a transport stream in the stream conversion circuit 44 from the head office 30. Coding stream STOLD changed into the form of the elementary stream is supplied to the stream splicer 50.
[0165]The stream splicer 50 is provided with the splice controller 500, the switching circuit 501, the stream analysis circuit 502, the stream processor 503, and the splicing circuit 504 as shown in drawing 20.
[0166]In the example about this 1st splicing processing, the splice controller 500 switches the input terminal of the switching circuit 501 to "a", and supplies the elementary stream STNEW supplied from the stream server 49 to the stream analysis circuit 502.
[0167]The stream analysis circuit 502 is a circuit which analyzes the syntax of coding stream STOLD and coding stream STNEW. The stream analysis circuit 502 specifically so that he can understand from the syntax of the coding stream indicated by drawing 10 and drawing 15, By looking for 32-bit picture_start_code described in coding stream STOLD, the place where the information about a picture header was described [be / it / under / stream / setting] is grasped. Next, the stream analysis circuit 502 grasps a picture type by finding picture_coding_type of the triplet which starts 11 bits [of picture_start_code] after, and. vbv_delay of a coding picture can be grasped from 16-bit vbv_delay described by the next of picture_coding_type of this triplet.
[0168]The stream analysis circuit 502 so that he can understand from the syntax of the coding stream indicated by drawing 10 and drawing 15, By looking for 32-bit extension_start_code described in coding stream STOLD and coding stream STNEW, the place where the information about a picture coding extension was described [be / it / under / stream / setting] is grasped. Next, 1-bit top_field_first the stream analysis circuit 502 was described to be after 25 bits of picture_start_code, The frame structure of a coding picture can be grasped by looking for repeat_first_field described after 6 bits of the top_field_first. For example, when "top_field_first" of a coding picture is "1." It is shown that a top field is the early frame structure

in time than a bottom field, and when "top_field_first" is "0", it is shown that a top field is the early frame structure in time than a bottom field. When the flag "top_field_first" in a coding stream is "0" and "repeat_first_field" is "1", It is shown that it is the picture structure that a repeat field is generated from a top field at the time of decryption, Having the picture structure that the flag "top_field_first" in a coding stream is "0", and a repeat field is generated from a bottom field at the time of decryption when "repeat_first_field" is "1" is shown.

[0169]picture_coding_type, vbv_delay, top_field_first, and repeat_first_field which were mentioned above are extracted from a coding stream for every picture, and are supplied to the splice controller 500. The elementary stream STOLD supplied to the stream analysis circuit 502 and the elementary stream STNEW are supplied to the stream processor 503 as the elementary stream STOLD and the elementary stream STNEW as it is.

[0170]The stream analysis circuit 502 is provided with the counter for counting the number of bits of the supplied stream STOLD and the stream STNEW, Based on this counted value and the generation bit amount of each picture, it is made to carry out the simulation of the data residue of a VBV buffer for every picture. The data residue of the VBV buffer for every picture calculated in the stream analysis circuit 502 is also supplied to the splice controller 500. [0171] The stream processor 503 so that the spliced stream STSPL generated by carrying out splicing of the stream STOLD and the stream STNEW may turn into a seamless stream, It is a circuit for changing the stream structure of this stream STOLD and the stream STNEW, a data element, and a flag. Concrete processing of this stream processor 503 is explained with reference to drawing 21.

[0172]The original stream STOLD to which drawing 21 (A) was supplied from the head office 30. Are a shown figure the locus of the data occupation rate of the VBV buffer of the stream STOLD, and drawing 21 (B), Are a shown figure the locus of the data occupation rate of the VBV buffer of the substitution stream STNEW memorized by the stream server 49 and its stream STNEW, and drawing 21 (B), In the splicing points SP1 and SP2, it is a figure showing the locus of the data occupation rate of the VBV buffer of the spliced stream STSPL which carried out splicing of the stream STOLD and the stream STNEW, and its spliced stream STSPL. In drawing 21 (A), DTS (decoding time stamp) is shown and SP1vbv, The 1st splicing point on the locus of the data occupation rate of a VBV buffer is shown, and SP2vbv, The 2nd splicing point on the locus of a VBV buffer data occupation rate is shown, and VO (I6), When picture B5 is pulled out from a VBV buffer, the data volume of the picture I6 buffered on the VBV buffer is shown, and GB (I6), The generation bit amount of the picture I6 is shown, and VD (I6), The value of vbv_delay of the picture I6 is shown and VO (B7), When the picture I6 is pulled out from a VBV buffer, the data volume of the picture B7 buffered on the VBV buffer is shown, and GB (B11), The generation bit amount of the picture B11 is shown, and VD (I12), The value of vbv_delay of the picture I12 is shown, and VO (I12) shows the data volume of the

picture I12 buffered on the VBV buffer, when the picture B11 is pulled out from a VBV buffer. In drawing 21 (B), GB (I6'), The generation bit amount of picture I6' is shown, and VD (I6'), The value of vbv_delay of picture I6' is shown and VO (I6'), The data volume buffered by the VBV buffer of picture I6' in 1st splicing point SP1vbv in VBV is shown, and GB (B11'), a picture -- B -- 11 -- ' -- a generation bit amount -- being shown -- VO (I12') -- VBV -- it can set -- the -- two -- splicing -- a point -- SP -- two -- vbv -- it can set -- a picture -- B -- 12 -- ' -- a VBV buffer -- buffering -- having -- **** -- data volume -- being shown -- **** . In drawing 21 (C), GB (I6"), The generation bit amount of picture I6" by which stream processing was carried out is shown so that the spliced stream STSPL may turn into a seamless stream, and VD (I6"), a picture -- I -- six -- " -- vbv_delay -- a value -- being shown -- GB (B11") -- spliced -- a stream -- STSPL -- being seamless -- a stream -- becoming -- as -- a stream -- processing -- carrying out -- having had -- a picture -- B -- 11 -- " -- a generation bit amount -- being shown -- **** .

[0173]Since the original stream STOLD is a stream coded at the head office 30 and the substitution stream STNEW is a stream coded in the local station 40, The stream STOLD and the stream STNEW are streams coded completely unrelated with each video encoder. That is, the value VD (I6) of vbv_delay of the first picture I6 in the stream STOLD and the value VD (I6') of vbv_delay of the first picture I6' in the stream STNEW are not the same values. That is, in the timing of stream splice point SP1vbv [in / in such a case / a VBV buffer], It will differ in the data occupation rate VO (I6) of VBV HAFFA of the original stream STOLD, and the data occupation rate VO (I6') of the VBV buffer of the substitution stream STNEW.

[0174]That is, in [as it explained in the background art of this invention] splice point SP1, or [that the data occupation rate of the VBV buffer of the stream by which the splice was carried out simply will become discontinuous if the splice of the stream STOLD and the stream STNEW is carried out simply] -- or overflow/underflow will carry out.

[0175]Then, based on the data element extracted from the stream STOLD and the stream STNEW in the stream analysis circuit 502 in the stream splicer 50, In the stream processor 503, stream processing is performed about the stream structure of the supplied stream STOLD and the stream STNEW so that the spliced stream STSPL may turn into a seamless stream in a splice point. The processing is explained below.

[0176]The splice controller 500 as a data element about the stream STOLD, For every picture, picture_coding_type, vbv_delay, Information, including top_field_first, repeat_first_field, etc., the generation bit amount in each picture, and the data occupation rate of the VBV buffer in each picture are received from the stream analysis circuit 502. In drawing 21, for example, the value of vbv_delay in the picture I6 is expressed as VD (I6), the generation bit amount in the picture I6 is expressed as GB (I6), and the data occupation rate of the VBV buffer in the picture I6 is expressed like VO (I6).

[0177]Next, the processing about the VBV buffer of the splice controller 500 in splice point SP1

and the stream processor 503 is explained.
[0178]First, the value VD (I6) of vbv_delay of the picture [in / in the splice controller 500 / splicing point SP1] I6 of the original stream STOLD, When it is judged that the values VD (I6') of vbv_delay of picture I6' of the substitution stream STNEW differ, Directions are given to the stream processor 503 so that the value of vbv_delay of picture I6' described in the substitution stream STNEW may be rewritten from VD (I6') to VD (I6).
[0179]The stream processor 503 rewrites the value of 16-bit vbv_delay described in the picture header of the substitution stream STNEW from VD (I6') to VD (I6) according to the directions from the splice controller 500.
[0180]The value of vbv_delay in the substitution stream STNEW is only rewritten from VD (I6') to VD (I6) here, Since the generation bit amount of picture I6' is insufficient when it tries to pull out a bit stream from a VBV buffer according to this rewritten vbv_delay, a VBV buffer will carry out underflow. Then, the splice controller 500 the generation bit amount GB (I6') of picture I6' of the substitution stream STNEW, Processing which inserts stuffing bytes to that of picture I6' of the substitution stream STNEW is performed so that it may become the generation bit amount GB (I6") of picture I6" of the seamless spliced stream STSPL. These stuffing bytes are data which comprises dummy bits of "0."
[0181]In order to perform processing which inserts stuffing bytes, the splice controller 500, The generation bit amount GB (I6) received as information about the picture I6 and the picture B7 in the stream STOLD, The data occupation rate VO (I6') of received generation bit amount GB (I6') and a VBV buffer is used as information about picture I6' in the data occupation rate VO (I6) of a VBV buffer, and the stream STNEW, The data volume of the stuffing bytes which should be inserted is calculated. It is based on the following formula (2) and, specifically, is stuffing-bytes SB1. [byte] calculates.
$SB1[byte] =\{GB(I6")-GB(I6')\}/ 8 =\{GB(I6)-GB(I6')+VO(B7)-VO (B7')\} / 8$ ... (2)
[0182]The splice controller 500 controls the stream processor 503 to insert SUTAFINGUBAITO SB1 calculated according to the upper type (2) into the stream STNEW.
[0183]The stream processor 503 describes SUTAFINGUBAITO SB1 in the stream STNEW according to the instructions from the splice controller 500. As a position which describes stuffing bytes in a stream, although the start code front of the picture header of the picture I6 of coding stream STNEW is the most desirable, even if it is before other start codes, it is satisfactory.
[0184]The above is control about the VBV buffer of the splice controller 500 in splice point SP1, and the stream processor 503.
[0185]Next, the control about the VBV buffer of the splice controller 500 in splice point SP2 and the stream processor 503 is explained.
[0186]Only in splice point SP2, supposing it carries out splicing of the stream STNEW and the

stream STOLD, Since the generation bit amount GB (B11') of picture B11' of the last of the stream STNEW is insufficient, it does not become a locus of the data occupation rate of the VBV buffer of the picture I12 of the beginning of the stream STNEW, and continuation. as a result, a VBV buffer -- underflow -- or it will overflow.
[0187]Then, in splice point SP2vbv [in / in the splice controller 500 / a VBV buffer], The generated code amount GB (B11') of picture B11' of the last of the stream STNEW so that it may become the generated code amount GB (11") of picture B11" of drawing 21 (C), so that the locus of a VBV buffer may become continuously, Processing which inserts stuffing bytes into the stream STNEW is performed.
[0188]In order to perform processing which inserts stuffing bytes, the splice controller 500, VO received as information about the picture I12 in the stream STOLD (I12), The generation bit amount GB (B11') of picture 11' of the last of the stream STNEW and the data occupation rate VO (I12') of the VBV buffer of picture 12' of the stream STNEW are used, and the data volume of the stuffing bytes which should be inserted is calculated. Specifically based on the following formula (2), stuffing-bytes SB2 [byte] calculates.
SB2 [byte] = {GB(B11")- GB(B11')}/ 8= {VO(I12') - VO (I12)} / 8 ... (3)
[0189]It can be put in another way as it being a data occupation rate of the VBV buffer about the stream STNEW after pulling out the last picture B11' from a VBV buffer in the data occupation rate VO (I12'), the stream analysis circuit 502 which grasps the locus of VBV by counting the number of bits of the stream STNEW -- easy -- this -- data occupation rate VO (I12') detection can be carried out.
[0190]This splice controller 500 controls the stream processor 503 to insert SUTAFINGUBAITO SB2 calculated according to the upper type (3) into the stream STNEW.
[0191]The stream processor 503 describes SUTAFINGUBAITO SB2 as information about picture B11' of the stream STNEW according to the instructions from the splice controller 500. As a position which describes stuffing bytes in a stream, the start code front of the picture header of picture B11' of coding stream STNEW is the most desirable.
[0192]The above is control about the VBV buffer of the splice controller 500 in splice point SP2, and the stream processor 503.
[0193]With reference to drawing 22, the 1st example of processing about flags, such as top_field_first of the splice controller 500 in splice point SP1 and the stream processor 503 and repeat_first_field, is explained.
[0194]Drawing 22 (A) is the figure showing coding stream STOLD when the TV program PGOLD is coded with the program 1 and commercial CM1 which were made at the head office 30, and the frame structure of TV program PGOLD which comprises the program 2. drawing 22 -- (-- B --) -- a local station -- 40 -- setting -- making -- having had -- substitution -- commercials -- CM -- one -- ' -- the frame structure -- the -- substitution -- commercials -- CM --

one -- ' -- ** -- having coded -- the time -- a coding stream -- STNEW -- being shown -- **** -- a figure -- it is . Drawing 22 (C) is the figure showing the frame structure when the spliced stream STSPL generated when it substitutes for the original stream STOLD and splicing of the stream STNEW is carried out, and its spliced stream STSPL are decoded.

[0195]top_field_first of each picture of commercial CM1 in the stream STOLD to which the splice controller 500 was supplied from the stream analysis circuit 502, top_field_first of commercial CM1' in the substitution stream STNEW is compared. Since field structure is the same if top_field_first in the stream STOLD and top_field_first in the substitution stream STNEW are in agreement, The processing about flags, such as top_field_first and repeat_first_field, is unnecessary. However, as shown in drawing 22, top_field_first of original commercial CM1 is "0", When top_field_first of substitution commercial CM1' is "1", the problem of discontinuity of the field and duplication which were explained in drawing 6 occurs.

[0196]Then, the stream splicer 50 of this invention, So that the stream of violation of an MPEG stream which the field is missing by splicing processing, or overlaps may not be generated, He is trying to rewrite top_field_first and repeat_first_field of a picture near a splicing point.

[0197]In the example shown in drawing 22, the splice controller 500 controls the stream processor 503 to rewrite repeat_first_field of the picture P3 by which a frame is constituted from the top field T4 and bottom field B4 from 0 to 1. The splice controller 500 so that it may become a seamless stream in splice point SP2, The stream processor 503 is controlled to rewrite repeat_first_field of picture P9' by which a frame is constituted from the top field t10 and the bottom field b11 from 0 to 1. When the splice controller 500 rewrote repeat_first_field of picture P9', Since commercial CM1' shifted only one frame time to original commercial CM1, the stream processor 503 is controlled to delete the picture B13 first displayed on a display in the program 2 out of the stream STOLD.

[0198]Based on directions of the splice controller 500, the stream processor 503, In the original stream STOLD, the start code of picture_coding_extension about the picture P3 is looked for, and the value of repeat_first_field in it is rewritten from 0 to 1. Therefore, since repeat field B4' will be generated if the picture P3 by which the value of repeat_first_field was rewritten in this way is decoded, the field will continue in splice point SP1. Similarly, the stream processor 503 looks for the start code of picture_coding_extension about picture P9' in the substitution stream STNEW, and rewrites the value of repeat_first_field in it from 0 to 1. Thus, since repeat field t10' will be generated if picture P9' by which the value of repeat_first_field was rewritten is decoded, the field will continue in splice point SP2. the portion the data element about the picture B13 was described to be in the stream processor 503 and the original stream STOLD -- the deletion out of the stream STOLD, or a null -- it transposes to data.

[0199]Drawing 23 expresses other examples of processing of the processing about flags explained in drawing 22, such as top_field_first and repeat_first_field. With reference to

drawing 23, the 2nd example of processing about flags, such as top_field_first of the splice controller 500 in the splice points SP1 and SP2 and the stream processor 503 and repeat_first_field, is explained.
[0200]In the example of processing shown in drawing 23, the splice controller 500, So that the field [of the program 1 and commercial CM1' in splice point SP1 / a bond] may continue, Rewrite top_field_first of picture B7' which comprises the top field t5 and the bottom field b6 from 1 to 0, and. The stream processor 503 is controlled to rewrite repeat_first_field of picture B7' from 0 to 1. The splice controller 500 so that the field [of the program 2 / a bond] may follow commercial CM1' in splice point SP2, The stream processor 503 is controlled to rewrite top_field_first of the picture B13 which comprises the top field T11 and the bottom field B11 from 1 to 0. The splice controller 500 rewrites top_field_first of the picture B14 which comprises the top field T12 and the bottom field B12 from 1 to 0, and. The stream processor 503 is controlled to rewrite repeat_first_field from 1 to 0.
[0201]According to control of the splice controller 500, the stream processor 503, In the substitution stream STNEW, the start code of picture_coding_extension about picture B7' is looked for, top_field_first in the stream is rewritten from 1 to 0, and repeat_first_field is rewritten from 0 to 1. Therefore, if picture B7' by which the value of top_field_first and repeat_first_field was rewritten in this way is decoded, Since the display time of the bottom field b6 shifts by one frame and repeat field b6' is generated, the field will continue in splice point SP1. Similarly, the stream processor 503 looks for the start code of picture_coding_extension about the picture B13 in the original stream STOLD, and rewrites top_field_first in it from 1 to 0. The stream processor 503 rewrites top_field_first about the picture B14 from 1 to 0 in the original stream STOLD, and it rewrites repeat_first_field from 1 to 0. Therefore, if the pictures B13 and B14 by which the value of top_field_first and repeat_first_field was rewritten in this way are decoded, Since the display time of the bottom fields B11 and B12 shifts by one frame, the field will continue in splice point SP2.
[0202]If the 1st example of processing shown in drawing 22 is compared with the 2nd example of processing shown in drawing 23 here, so that he can understand from drawing 22 (C), Rather than the picture B7 displayed on the beginning of original commercial CM1, since only the 1 field has shifted, picture B7' displayed on the beginning of substituted commercial CM1', Only the 1 field will be in the display timing of substituted commercial CM1'. By 1 field ****** grade, human being's eyes hardly understand a display for the delay. However, since the income has been obtained by broadcasting the commercials from a KURAI and company at a broadcasting station, it may be required that it should not be late for broadcasting this editing of program 1 grade, and commercials should be correctly broadcast rather than it. When such exact display time is required, the 2nd example of processing shown in drawing 23 is effective. By rewriting top_field_first of picture B7', and the value of repeat_first_field like the 2nd

example of processing shown in drawing 23, It can be behind to the picture displayed on the beginning of original commercial CM1, and picture B7' of the beginning of substituted commercial CM1' can be displayed correctly [there is nothing and].

[0203]That is, the locus of the data occupation rate of the VBV buffer of the stream STNEW outputted from the stream processor 503, The locus and compatibility of the data occupation rate of the stream STOLD can be taken, and the compatibility about a field pattern / frame pattern can be taken. [of the VBV buffer] Therefore, by controlling the switching operation of the splicing circuit 504 based on the control signal from the splice controller 500 by splice point SP1. Connect after the stream STOLD and the stream STNEW by splice point SP2. In [are the stream generated by connecting the stream STOLD after the stream STNEW, and] the splice points SP1 and SP2, The spliced stream STSPL to which the locus of the data occupation rate of a VBV buffer is continuing, and the field pattern / frame pattern has become continuously is generated.

[0204]Next, the example about the 2nd splicing processing is described. The example about the 2nd splicing processing, When coding stream STOLD of a transmission program has been transmitted from the head office 30, it is an example about the splicing processing performed when coding commercial CM' inserted newly and generating coding stream STNEW. That is, it is the method of analyzing coding stream STOLD of the transmission program transmitted from the head office 30, and coding commercial CM1' inserted newly based on the analysis result.

[0205]First, transmitted coding stream STOLD is changed into the form of an elementary stream from the form of a transport stream in the stream conversion circuit 44 from the head office 30. Coding stream STOLD changed into the form of the elementary stream is supplied to the stream analysis circuit 502 of the stream splicer 50.

[0206]The stream analysis circuit 502 of the stream splicer 50 is a circuit for analyzing the stream syntax of coding stream STOLD. In the example about this 2nd splicing processing, this stream analysis circuit 502 conducts only analysis of the syntax of coding stream STOLD, and does not conduct analysis of the syntax of the substitution stream STNEW.

[0207]First specifically the stream analysis circuit 502, So that he can understand from the syntax of the coding stream indicated by drawing 10 and drawing 15, By looking for 32-bit picture_start_code described in the original stream STOLD, the place where the information about a picture header was described [be / it / under / stream / setting] is grasped. Next, the stream analysis circuit 502 grasps a picture type by finding picture_coding_type of the triplet which starts 11 bits [of picture_start_code] after, and. vbv_delay of a coding picture can be grasped from 16-bit vbv_delay described by the next of picture_coding_type of this triplet.

[0208]The stream analysis circuit 502 so that he can understand from the syntax of the coding stream indicated by drawing 10 and drawing 15, By looking for 32-bit extension_start_code described in coding stream STOLD, the place where the information about a picture coding

extension was described [be / it / under / stream / setting] is grasped. Next, 1-bit top_field_first the stream analysis circuit 502 was described to be after 25 bits of picture_start_code, The frame structure of a coding picture can be grasped by looking for repeat_first_field described after 6 bits of the top_field_first.

[0209]. The stream analysis circuit 502 was extracted for every picture out of the original stream STOLD. Data elements, such as picture_coding_type, vbv_delay, top_field_first, and repeat_first_field, are supplied to the broadcast system controller 41 via the splice controller 500. There is no necessity of sending the data element of all the pictures of the original stream STOLD, They may be only data elements, such as picture_coding_type of the picture corresponding to commercial CM1 in a transmission program, vbv_delay, top_field_first, and repeat_first_field.

[0210]Next, the broadcast system controller 41 controls the CM server 47 to reproduce the video data of commercial CM1' substituted for the portion of commercial CM of a transmission program. picture_coding_type by which the broadcast system controller 41 was extracted from the original stream STOLD, vbv_delay, top_field_first, and repeat_first_field are supplied to the encoder controller 480 of the encoder block 48.

[0211]picture_coding_type to which the encoder controller 480 was supplied from the broadcast system controller 41, vbv_delay, top_field_first, and repeat_first_field are used and the encoder 481 is controlled to encode the baseband video data of substitution commercial CM1'. Namely, picture_coding_type, vbv_delay, top_field_first, and repeat_first_field of coding stream STOLD of original commercial CM1, picture_coding_type of the stream STNEW which coded substitution commercial CM1', Substitution commercial CM1' is coded so that vbv_delay, top_field_first, and repeat_first_field may completely become the same. As a result, picture_coding_type, vbv_delay, top_field_first, and repeat_first_field of coding stream STOLD of original commercial CM1, The coded stream STNEW with the completely same picture_coding_type, vbv_delay, top_field_first, and repeat_first_field is generated.

[0212]The splice controller 501 switches the input terminal of the switching circuit 501 to "b", and supplies the elementary stream STNEW outputted from the encoder 481 to the stream analysis circuit 502. In the example about this 2nd splicing processing, Since this stream analysis circuit 502 conducts only analysis of the syntax of coding stream STOLD and analysis of the syntax of the substitution stream STNEW is not conducted, the stream STNEW is outputted as it is, without carrying out analysis processing in the stream analysis circuit 502.

[0213]In the example about this 2nd splicing processing, the stream processor 503. Since stream processing which changes the data element in the stream STOLD outputted from the stream analysis circuit 502 and the stream STNEW is unnecessary, Only matching synchronization processing (frame synchronization) which doubles the frame synchronization of the stream STOLD and the stream STNEW is performed. Specifically this stream processor

503, Until it has a FIFO buffer for several frames and the substitution stream STNEW is outputted from the encoder 481, By buffering the stream STOLD in this FIFO buffer, the frame synchronization of the stream STOLD and the stream STNEW can be doubled. The stream STOLD and the stream STNEW by which frame synchronization doubling processing was carried out are supplied to the splicing circuit 504.
[0214]As for the splice controller 500, in splicing point SP1, the stream STNEW is connected after the stream STOLD, Switching of the splicing circuit 504 is controlled so that the stream STOLD is connected to the next of the stream STNEW in splicing point SP2. As a result, the spliced stream STSPL is outputted from the splicing circuit 504.
[0215]Simply, in the splicing circuit 504, although the stream STOLD and the stream STNEW are only switched, The locus of the data occupation rate of the VBV buffer of the spliced stream STSPL has become continuously, and the frame pattern in a splice point is also continuing. Because, since coding processing of the stream STNEW is carried out based on the analysis result of the syntax of a stream, the original stream STOLD, Since the stream STNEW which was able to take compatibility to the original stream STOLD is generated, the locus of the VBV buffer of the spliced stream STSPL, It is because it is completely the same as the locus of the VBV buffer of the original stream STOLD and the frame structure of the generated spliced stream STSPL is completely the same as that of the original stream STOLD.

[0216]Therefore, according to this 2nd example, the syntax of original coding stream STOLD transmitted from the head office is analyzed, Since substitution commercial CM1' is coded according to the analysis result so that it may have the same stream structure and encoding parameter as coding stream STOLD, When carrying out splicing of coding stream STOLD and coding stream STNEW which were generated according to, respectively, the compatibility of coding stream STOLD and coding stream STNEW is doubled -- things -- splicing could be performed easily, and, as a result, it applied to the MPEG standard correspondingly, and the seamless spliced stream STSPL can be generated.
[0217]Next, the example about the 3rd splicing processing is described. The example about the 3rd splicing processing, As for original commercial CM1, coding stream STOLD reaches, Before generating coding stream STNEW of commercial CM1' substituted, In order to substitute for coding stream STOLD of original commercial CM1 and to code coding stream STNEW of commercial CM1' beforehand, the encoding parameter of ** is determined, It is processing in which original commercial CM1 and substitution commercial CM1' is coded based on the decided encoding parameter. For example, this encoding parameter is information shown with picture_coding_type, vbv_delay, top_field_first, repeat_first_field, etc. which were already explained, a generation bit amount, etc.
[0218]First, at the head office 30, picture_coding_type, vbv_delay, top_field_first, and

repeat_first_field are determined as an encoding parameter for coding original commercial CM1. The broadcast system controller 31 of the head office 30 supplies the encoding parameter to the encoder controller 350 of the MPEG encoder block 35, and it supplies it also to the broadcast system controller 41 of each local station 40 using a communication line.
[0219]picture_coding_type to which the encoder controller 350 was supplied from the broadcast system controller 31, Video encoder 351-1V is controlled to code the video data of original commercial CM1 using encoding parameters, such as vbv_delay, top_field_first, and repeat_first_field. Namely, coding stream STOLD outputted from video encoder 351-1V, It is a stream based on encoding parameters, such as picture_coding_type, vbv_delay, top_field_first, and repeat_first_field.
[0220]Coding stream STOLD outputted from video encoder 351-1V is supplied to the local station 40 via the multiplexer 36 and the modulation circuit 37.
[0221]picture_coding_type to which the local station 40 was supplied from the broadcast system controller 31 of the head office 30 on the other hand, Encoding parameters, such as vbv_delay, top_field_first, and repeat_first_field, are supplied to the encoder controller 480 of the encoder block 48.
[0222]picture_coding_type to which the encoder controller 480 was supplied from the broadcast system controller 41, vbv_delay, top_field_first, and repeat_first_field are used and the encoder 481 is controlled to encode the baseband video data of substitution commercial CM1'. Namely, picture_coding_type, vbv_delay, top_field_first, and repeat_first_field of coding stream STOLD of original commercial CM1, The coded stream STNEW with the completely same picture_coding_type, vbv_delay, top_field_first, and repeat_first_field is generated.
[0223]The splice controller 501 switches the input terminal of the switching circuit 501 to "b", and supplies the elementary stream STNEW outputted from the encoder 481 to the stream analysis circuit 502. In the example about this 3rd splicing processing, this stream analysis circuit 502 does not conduct analysis of the syntax of coding stream STOLD and coding stream STNEW.
[0224]In the example about this 2nd splicing processing, the stream processor 503. Since stream processing which changes the data element in the stream STOLD outputted from the stream analysis circuit 502 and the stream STNEW is unnecessary, Only matching synchronization processing (frame synchronization) which doubles the frame synchronization of the stream STOLD and the stream STNEW is performed. Specifically this stream processor 503, Until it has a FIFO buffer for several frames and the substitution stream STNEW is outputted from the encoder 481, By buffering the stream STOLD in this FIFO buffer, the frame synchronization of the stream STOLD and the stream STNEW can be doubled. The stream STOLD and the stream STNEW by which frame synchronization doubling processing was carried out are supplied to the splicing circuit 504.

[0225]As for the splice controller 500, in splicing point SP1, the stream STNEW is connected after the stream STOLD, Switching of the splicing circuit 504 is controlled so that the stream STOLD is connected to the next of the stream STNEW in splicing point SP2. As a result, the spliced stream STSPL is outputted from the splicing circuit 504.
[0226]Simply, in the splicing circuit 504, although the stream STOLD and the stream STNEW are only switched, The locus of the data occupation rate of the VBV buffer of the spliced stream STSPL has become continuously, and the frame pattern in a splice point is also continuing. . Because, in the broadcast system controller 31 of the head office 30, were determined beforehand. Encoding parameters, such as picture_coding_type, vbv_delay, top_field_first, and repeat_first_field, are used, It is because original commercial CM1 and substitution commercial CM1' is coded.
[0227]Therefore, according to this 3rd example, the encoding parameter is beforehand determined between the head office and a local station, Coding stream STOLD which coded original commercial CM1 at the head office based on the decided coding PAMETATA is generated, Since he is trying to generate coding stream STNEW which substituted at the head office based on the decided coding PAMETATA, and coded commercial CM1', When carrying out splicing of coding stream STOLD and coding stream STNEW which were generated according to, respectively, the compatibility of coding stream STOLD and coding stream STNEW is doubled -- things -- splicing could be performed easily, and, as a result, it applied to the MPEG standard correspondingly, and the seamless spliced stream STSPL can be generated.
[0228]
[Effect of the Invention]According to the coding stream splicing device of claim 1, and the coding stream generating device of claim 21. A stream analysis means to extract the encoding parameter of the 1st coding stream by analyzing the syntax of the 1st coding stream, Based on the encoding parameter of the 1st coding stream obtained by the stream analysis means, so that the 1st coding stream and 2nd coding stream may be seamlessly connected in a splicing point, By changing the encoding parameter of the 2nd coding stream and having a splicing means which carries out splicing of the 1st coding stream and the 2nd coding stream by which the encoding parameter was changed, The seamless splicing processing which the locus of the data occupation rate of the VBV buffer of the stream by which splicing was carried out is continuation, and does not carry out VBV buffer ****** is realizable. According to this invention, the stream structure of the coding stream before and behind a splicing point can realize splicing processing which can generate the seamless stream which was able to take the compatibility which does not become discontinuous.
[0229]According to the coding stream splicing method of claim 11, and the coding stream generation method of claim 22. The stream analysis step which extracts the encoding

parameter of the 1st coding stream by analyzing the syntax of the 1st coding stream, Based on the encoding parameter of the 1st coding stream obtained by the stream analysis step, so that the 1st coding stream and 2nd coding stream may be seamlessly connected in a splicing point, By changing the encoding parameter of the 2nd coding stream and performing the splicing step which carries out splicing of the 1st coding stream and the 2nd coding stream by which the encoding parameter was changed, The seamless splicing processing which the locus of the data occupation rate of the VBV buffer of the stream by which splicing was carried out is continuation, and does not carry out VBV buffer ****** is realizable. According to this invention, the stream structure of the coding stream before and behind a splicing point can realize splicing processing which can generate the seamless stream which was able to take the compatibility which does not become discontinuous.

[0230]According to the information processor of claim 23, and the information processing method of claim 27. Since some received data is replaced with other data, the data of the others to replace is coded, and the received data was changed so that other data and consistency could be taken, exchange of data is attained without producing mismatching etc.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

PRIOR ART

[Description of the Prior Art]Drawing 1 is a figure for explaining the present television broadcasting system. In the present television broadcasting system, the broadcasting station for distributing a TV program to each home, It comprises two or more local stations (branch office) SA, SB, and SC of the head office series which creates head office (key station or main station) SK which makes the TV program of a nationwide scale, and a TV program peculiar to rural areas. Head office SK creates a TV program common to the whole country, and are the created TV program a broadcasting station for transmitting to a local station, and a local station, It is a broadcasting station for distributing the program of both the original TV program sent by transmission between offices from the head office, and the TV program which edited the original TV program part for district characteristic to a local home. For example, as shown in drawing 1, the local station EA, It is an office which creates the TV program transmitted to the home in the broadcasting areas EA, local station EB is an office which creates the TV program transmitted to the home in broadcasting-areas EB, and local station EC is an office which creates the TV program transmitted to the home in broadcasting-areas EC. The editing processing performed in each of this local station is processing which inserts the program of a weather report original with rural areas in the news program sent from the head office, for example, or inserts rural-areas-oriented commercials in programs, such as a movie and a drama.
[0003]Drawing 2 is the editing processing in each local station a figure for explaining, and drawing 2 (A), Original TV program PGOLD made at the head office is shown, drawing 2 (B) is substitution TV program PGNEW for the districts made in the local station, and drawing 2 (C) shows TV program PGEDIT edited in the local station. The inside of the original TV program to which the example of the editing processing shown in drawing 2 has been transmitted from the head office, commercials -- CM -- one -- a program -- two -- and -- commercials -- CM -- three -- a local station -- setting -- a district -- **** -- making -- having had -- commercials -- CM -- one

-- ' -- a program -- two -- ' -- and -- commercials -- CM -- three -- ' -- replacing -- editing processing -- an example -- it is . As a result of the editing processing in this local station, as shown in drawing 2 (C), The TV program for the districts where the TV program (the program 1, CM2, program 3C, and program 4) generated at the head office and the TV program (commercial CM1', program 2' and commercial M3') generated in the local station are intermingled is generated.

[0004]In recent years, since the present television broadcasting system is analog broadcasting which distributes the television signal of the baseband of an analog to each home, the trial in which these analog method systems will be transposed to the broadcasting system of the next generation which uses digital technique is made. This digital broadcasting system carries out compression encoding of a video data or the audio information using compression encoding art, such as MPEG 2 (Moving PictureExperts Group Phase2), It is a system which transmits the coded stream to each home or an other station using a terrestrial wave or a satellite wave. In the broadcast art especially proposed as this digital broadcasting system, The DVB (Digital Video Broadcasting) standard proposed as a next-generation broadcasting format in Europe is the most leading, and this DVB standard is becoming de facto SUTAN dirt.

[0005]Next, the program which contained a video data and audio information using the MPEG standard with reference to drawing 3 is explained about the common digital transmission system transmitted to a receiving system from a transmitting side system.

[0006]In a common digital transmission system, the transmission side system 10, It had MPEG video encoder 11, MPEG audio encoder 12, and the multiplexer 13, and the receiving system 20 is provided with the demultiplexer 21, MPEG video encoder 22, and MPEG audio decoders.

[0007]MPEG video encoder 11 codes the source video data V of baseband based on an MPEG standard, and outputs the coded stream as the video elementalist ream ES. MPEG audio encoder 12 codes the sauce audio information A of baseband based on an MPEG standard, and outputs the coded stream as the audio elementalist ream ES. The multiplexer 13 from MPEG video encoder 11 and MPEG audio encoder 12. A video elementary stream and audio elementalist ream are received, respectively, Those streams are changed into the gestalt of a transport stream packet, and the transport stream packet having contained video elementalist ream and the transport stream packet having contained audio elementalist ream are generated. The multiplexer 13 so that the transport stream packet having contained video elementalist ream and the transport stream packet having contained audio elementalist ream may be intermingled, Each transport stream packet is multiplexed and the transport stream transmitted to the receiving system 20 is generated.

[0008]The demultiplexer 21 receives the transport stream transmitted via the transmission line, and divides it into the transport stream having contained video elementalist ream and the

transport stream packet having contained audio elementalist ream. While the demultiplexer 21 generates a video elementary stream from the transport stream packet having contained video elementalist ream, An audio elementary stream is generated from the transport stream packet having contained audio elementalist ream. MPEG video decoder 22 receives a video elementary stream from the demultiplexer 21, decodes this video elementalist ream based on an MPEG standard, and generates the video data V of baseband. MPEG audio decoders 22 receive an audio elementary stream from the demultiplexer 21, decode this audio elementalist ream based on an MPEG standard, and generate the audio information A of baseband.
[0009]Now, when it is going to transpose the conventional analog broadcasting system to a digital broadcasting system using the art of such a digital transmission system, the video data of the TV program transmitted towards a local station serves as a coding stream by which compression encoding was carried out based on the MPEG 2 standard from the head office. Therefore, in order to perform editing processing for transposing a part of original coding stream transmitted from the head office in the local station to the coding stream made in the local station. Before this editing processing, an end and a coding stream must be decoded and it must return to the video data of baseband. It is because the prediction direction of each picture contained in the coding stream according to an MPEG standard relates to the prediction direction of the picture of order, and mutual, so a coding stream is not connectable in the arbitrary positions on a stream. Supposing it connects two coding streams forcibly, the thing which eye a bond of a coding stream becomes discontinuous and does not do and it becomes impossible to decode correctly will occur.
[0010]Therefore, in order to realize editing processing which was explained in drawing 2. Decoding which carries out end decoding of both the original coding stream supplied from the head office, and the coding stream made for districts, and returns each to the video signal of baseband, The video data of two baseband must be edited and editing processing which generates the edited video data for broadcasting, and coding processing in which code the edited video data again and a coding video stream is generated must be performed. However, since the coding/decoding processing based on an MPEG standard were not coding/decoding processing reversible 100%, there was a problem that image quality will deteriorate whenever it repeats decoding processing and coding processing.
[0011]So, recent years have come to require the art which makes it possible to edit with the state of a coding stream, without carrying out decoding processing of the supplied coding stream. On the bit stream level coded in this way, it is calling it "splicing" to connect two different encoded bit streams and to generate the connected bit stream, and it is required. That is, splicing means editing and connecting two or more streams with the state of a coding stream.
[0012]However, in order to realize this splicing processing, there are the two following

problems.
[0013]First, the 1st problem is explained.
[0014]In the MPEG standard currently used in MPEG video encoder 11 and MPEG video decoder 22 which were mentioned above, the bidirectional prediction-coding method is adopted as a coding mode. In this bidirectional prediction-coding method, coding of three types, the formation of a frame inner code, inter-frame forward direction prediction coding, and bidirectional prediction coding, is performed, and the picture by each coding type, It is called I picture (intra coded picture), P picture (predictive coded picture), and B picture (bidirectionally predictive coded picture), respectively. GOP (Group of Picture) used as the unit of random access is constituted combining each picture of I, P, and B appropriately. Generally, the generated code amount of each picture has most I pictures, then there are many P pictures, and there are few B pictures.
[0015]In the encoding method from which a bit yield differs for every picture like an MPEG standard. In order to decrypt correctly the encoded bit streams (only henceforth a stream) obtained in a video decoder and to acquire a picture, the data occupation rate in the input buffer in the video decoder 22 must be grasped with the video encoder 11. So, in an MPEG standard, the virtual buffer a 'VBV (Video Buffering Verifier) buffer' is assumed as a buffer corresponding to the input buffer in the video decoder 22, the video encoder 11 -- a VBV buffer -- a breakdown, i.e., an underflow, -- it is defined as performing coding processing so that it may not be made to overflow. For example, the capacity of this VBV buffer is decided according to the standard of the signal transmitted.
If it is a case of the standard video signal of a main profile main level (MP@ML), it has 1.75M bit capacity.
the video encoder 11 -- this VBV buffer -- overflow -- the bit yield of each picture is controlled not to carry out an underflow.
[0016]Next, a VBV buffer is explained with reference to drawing 4.
[0017]The original stream STOLD which coded the original TV program having contained the program 1 by which drawing 4 (A) was made at the head office, and commercial CM1 with the video encoder. It is a figure showing the locus of the data occupation rate of the VBV buffer corresponding to the original stream STOLD. Commercial CM1' which drawing 4 (B) is the commercials made for districts, and is substituted for the portion of commercial CM1 of an original TV program, It is a figure showing the locus of the data occupation rate of the VBV buffer of the substitution stream STNEW coded with the video encoder of the local station, and its substitution stream STNEW. Since a part of stream which coded the original TV program transmitted to the branch office from the head office in the following explanation is replaced by the new stream created in the branch office, It is expressed as 'STOLD' which shows that it is an old stream about the original stream which coded this cage JINARUTEBI program, and the

substitution stream newly substituted for a part of original stream STOLD is expressed as 'STNEW'. The spliced stream STSPL (spliced stream) obtained by substituting drawing 4 (C) to the original stream STOLD in splice point SP, and carrying out splicing of the stream STNEW. It is a figure showing the locus of the data occupation rate of the VBV buffer of the spliced stream STSPL.

[0018]In drawing 4, in the locus of the data occupation rate of a VBV buffer, an upward-slant-to-the-right portion (inclination portion) expresses a transmission bit rate, and the portion which has fallen vertically expresses the bit quantity which a video decoder pulls out from decoder buffers for reproduction of each picture. The timing to which a video decoder pulls out a bit from these decoder buffers is specified using the information called a decoding time stamp (DTS). In drawing 4, I, P, and B express I picture, P picture, and B picture, respectively.

[0019]Since original coding stream STOLD is the stream by which the video encoder coding of the head office was carried out and the substitution stream STNEW is a stream coded with the video encoder of the local station, It substitutes for original coding stream STOLD, and the stream STNEW is a stream coded completely unrelated with each video encoder. Therefore, since the video encoder of the local station is performing coding processing for completely generating the substitution stream STNEW for the locus of the data occupation rate of the VBV buffer of the video encoder of the head office uniquely to not knowing, It will differ from data occupation rate VBVOLD of the VBV buffer of the original stream STOLD in splice point SP, and data occupation rate VBVNEW of the VBV buffer of the substitution stream STNEW in splice point SP.

[0020]That is, in order to keep the locus of the data occupation rate of a VBV buffer from becoming discontinuous before and behind splice point SP of the spliced stream STSPL. The init level of the data occupation rate of the VBV buffer of the substitution stream STNEW in the spliced stream STSPL must be set to data occupation rate VBVOLD of a VBV buffer. As a result, as shown in drawing 4, rather than data occupation rate VBVOLD of the VBV buffer of the original stream STOLD. When the value of data occupation rate VBVNEW of the VBV buffer of the substitution stream STNEW is small, a VBV buffer will overflow in the portion of the substitution stream STNEW in the spliced stream STSPL. Conversely rather than data occupation rate VBVOLD of the VBV buffer of the original stream STOLD. When the value of data occupation rate VBVNEW of the VBV buffer of the substitution stream STNEW is large, a VBV buffer will carry out underflow in the portion of the substitution stream STNEW in the splice stream STSPL.

[0021]Next, the 2nd problem is explained.

[0022]The various data elements and flags which show encoded information are described by the header of the stream coded based on the MPEG standard.

It is made as [decrypt / using these data elements or flags / a coding stream].

[0023]The program 1, the program 2, the program 3, and the program 4 which constitute this editing of the original TV program shown in drawing 2, The television signal of the NTSC system which has the 29.97 Hz (about 30 Hz) frame rate photoed with the video camera etc. may be a signal changed into the television signal from the movie raw material which does not restrict but has a 24 Hz (per second 24 tops) frame rate. Since the processing which changes into the three fields the two fields [in / for the processing which generally changes a 24-Hz movie raw material into a 29.97-Hz television signal in this way / an original raw material] by a predetermined sequence is included, it is called '2:3 pulldown processing'.
[0024]Drawing 5 is a figure for explaining this 2:3 pulldown processing. In drawing 5, T1 to T8 shows the top field of the movie raw material which has the frame frequency of 24 Hz, and B1 to B9 shows the bottom field of the movie raw material which has the frame frequency of 24 Hz. The ellipse and triangle which were shown in drawing 5 show the structure of the frame which comprises a top field and a bottom field.
[0025]In this 2:3 pulldown processing, specifically for the movie raw material (the eight top fields T1-T8 and eight bottom fields B1-B8) which has the frame frequency of 24 Hz. Repeat field B-2' generated by repeating bottom field B-2, Repeat field T4' generated by repeating the top field T4, Processing which inserts four repeat fields of repeat field B6' generated by repeating bottom field B6 and repeat field T8' generated by repeating the top field T8 is performed. As a result, the television signal which has the frame frequency of 29.97 Hz by this 2:3 pulldown processing from the movie raw material which has the frame frequency of 24 Hz is generated.
[0026]In an MPEG encoder, after coding processing of the television signal by which 2:3 pulldown processing was carried out is not carried out as it is in a video encoder but removing a repeat field from the television signal by which 2:3 pulldown processing was carried out, a coding place is performed. drawing 5 -- having been shown -- an example -- **** -- 2:3 -- pulldown -- carrying out -- having had -- a television signal -- from -- a repeat field -- B-2 -- ' -- T -- four -- ' -- B6 -- ' -- and -- T -- eight -- ' -- removing -- having . Thus, this repeat field is the redundant field inserted at the time of 2:3 pulldown processing, and the reason for removing a repeat field before coding processing is that image quality deterioration does not occur at all even if it deletes in order to raise compression encoding efficiency.
[0027]By repeating one field of the two fields which constitute a frame in an MPEG standard, when decoding a coding stream, It defines describing the flag 'repeat_first_field' which shows whether a repeat field is generated. When an MPEG decoder decodes a coding stream, specifically, When the flag "repeat_first_field" in a coding stream is "1", a repeat field is generated, and when the flag "repeat_first_field" in a coding stream is "0", processing in which a repeat field is not generated is performed.

[0028]"repeat_first_field" of the stream which coded the frame which comprises the top field T1 and the bottom field B1 in the case of the example shown in drawing 5 is "0", "repeat_first_field" of the stream which coded the frame which comprises the top field T2 and bottom field B-2 is "1", "repeat_first_field" of the stream which coded the frame which comprises top field T3 and the bottom field B3 is "0", Since "repeat_first_field" of the stream which coded the frame which comprises the top field T4 and bottom field B4 is "1", When decoding the coding stream of the frame which comprises the top field T2 and bottom field B-2, Repeat field B-2' is generated, and when decoding the coding stream of the frame which comprises the top field T4 and bottom field B4, processing which generates repeat field B4' is performed.
[0029]In an MPEG standard, it defines that the first field describes the flag 'top_field_first' which shows a top field or a bottom field, in a coding stream between the two fields which constitute a frame. When "top_field_first" is "1", specifically, It is shown that a top field is the early frame structure in time than a bottom field, and when "top_field_first" is "0", it is shown that a top field is the early frame structure in time than a bottom field.
[0030]"top_field_first" of the coding stream of the frame which comprises the top field T1 and the bottom field B1 in the example shown in drawing 5 is "0", "top_field_first" of the coding stream of the frame which comprises the top field T2 and bottom field B-2 is "1", "top_field_first" of the coding stream of the frame which comprises top field T3 and the bottom field B3 is "0", "top_field_first" of the coding stream of the frame which comprises the top field T4 and bottom field B4 is "1."
[0031]Next, with reference to drawing 6, the problem generated about the flag defined in MPEG standards, such as "top_field_first" when splicing processing of the coding stream is carried out, and "repeat_first_field", is explained.
[0032]Drawing 6 (A) is a shown figure the frame structure of the original stream STOLD which coded the original TV program made at the head office, and drawing 5 (B), It is the figure showing the frame structure of the substitution stream STNEW which coded commercial C1' for the districts made in the local station, and drawing 5 (C) is the figure showing the frame structure of the spliced stream STSPL by which splicing processing was carried out.
[0033]The program 1 and the program 2 in the original stream STOLD, It is the coding stream by which both 2:3 pulldown processings were carried out, and each frame of commercial CM1 of this editing is a coding stream of the frame structure from which "top_field_first" is "0." District commercial CM1' shown in drawing 6 (B) is a coding stream substituted for the portion of commercial CM1 of an original TV program, and is a coding stream of the frame structure from which "top_field_first" is "1." The spliced stream STSPL shown in drawing 6 (C). The splice of the substitution stream STNEW is carried out after the original stream STOLD shown by the program 1, It is the stream generated by carrying out the splice of the original stream

STOLD shown by the program 2 after the substitution stream STNEW. That is, the spliced stream STSPL is a stream which inserted district commercial CM1' instead of this editing commercial CM1 of the original stream STOLD.

[0034]Each frame of commercial CM1 made at the head office shown in drawing 6, top_field_first is a coding stream of the frame structure of "0", and commercial CM1' made in the local station shows that top_field_first is a coding stream of the frame structure of "1."

[0035]As shown in drawing 6 (A) and drawing 6 (B), the frame structure of commercial CM1, When the frame structure of substitution commercial CM1' substituted to commercial CM1 differs, by splice point SP1 of the original stream SPOLD. If the splice of the stream of commercial CM1' is carried out after the stream of the program 1, the gap of the field will arise in the spliced stream STSPL. Bottom field B6 in splice point SP1 drops out of the spliced stream STSPL, and the gap of the field means that the repeated pattern of a top field and a bottom field is discontinuous, as shown in drawing 6 (C).

[0036]Thus, the coding stream to which the gap of the field arises and the field pattern is discontinuous is a coding stream of violation of an MPEG standard, and cannot be normally decrypted by the usual MPEG decoder.

[0037]As shown in drawing 6 (A) and drawing 6 (B), by splice point SP2 of the original stream SPOLD. If the splice of the stream of the program 2 is carried out after the stream of commercial CM1', duplication of the field will arise and carry out in the spliced stream STSPL. As shown in drawing 6 (C), the bottom field b12 and the bottom field B12 in splice point SP2 mean existing in the same display time as duplication of this field.

[0038]Thus, the coding stream to which duplication of the field arises and the field pattern is discontinuous is a coding stream of violation of an MPEG standard, and cannot be normally decrypted by the usual MPEG decoder.

[0039]That is, when SUPURASHINGU processing was performed simply, the field pattern / frame pattern became discontinuous, and the spliced stream according to an MPEG standard was not able to be generated.

[Translation done.]

EFFECT OF THE INVENTION

[Effect of the Invention]According to the coding stream splicing device of claim 1, and the coding stream generating device of claim 21. A stream analysis means to extract the encoding parameter of the 1st coding stream by analyzing the syntax of the 1st coding stream, Based on the encoding parameter of the 1st coding stream obtained by the stream analysis means, so that the 1st coding stream and 2nd coding stream may be seamlessly connected in a splicing point, By changing the encoding parameter of the 2nd coding stream and having a splicing means which carries out splicing of the 1st coding stream and the 2nd coding stream by which the encoding parameter was changed, The seamless splicing processing which the locus of the data occupation rate of the VBV buffer of the stream by which splicing was carried out is continuation, and does not carry out VBV buffer ****** is realizable. According to this invention, the stream structure of the coding stream before and behind a splicing point can realize splicing processing which can generate the seamless stream which was able to take the compatibility which does not become discontinuous.
[0229]According to the coding stream splicing method of claim 11, and the coding stream generation method of claim 22. The stream analysis step which extracts the encoding parameter of the 1st coding stream by analyzing the syntax of the 1st coding stream, Based on the encoding parameter of the 1st coding stream obtained by the stream analysis step, so that the 1st coding stream and 2nd coding stream may be seamlessly connected in a splicing point, By changing the encoding parameter of the 2nd coding stream and performing the splicing step which carries out splicing of the 1st coding stream and the 2nd coding stream by which the encoding parameter was changed, The seamless splicing processing which the locus of the data occupation rate of the VBV buffer of the stream by which splicing was carried out is continuation, and does not carry out VBV buffer ****** is realizable. According to this invention, the stream structure of the coding stream before and behind a splicing point can realize splicing processing which can generate the seamless stream which was able to take the

compatibility which does not become discontinuous.
[0230]According to the information processor of claim 23, and the information processing method of claim 27. Since some received data is replaced with other data, the data of the others to replace is coded, and the received data was changed so that other data and consistency could be taken, exchange of data is attained without producing mismatching etc.

[Translation done.]

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention]The purpose of this invention is to provide the coding stream splicing device for realizing seamless splicing processing which the locus of the data occupation rate of the VBV buffer of the stream by which splicing was carried out is continuation, and does not carry out VBV buffer ******. It is in providing a coding stream splicing device for the stream structure of the coding stream before and behind a splicing point to realize seamless splicing processing which does not become discontinuous.

[Translation done.]

MEANS

[Means for Solving the Problem]The coding stream splicing device according to claim 1, A stream analysis means to extract an encoding parameter of the 1st coding stream by analyzing syntax of the 1st coding stream, Based on an encoding parameter of the 1st coding stream obtained by a stream analysis means, so that the 1st coding stream and 2nd coding stream may be seamlessly connected in a splicing point, An encoding parameter of the 2nd coding stream was changed and it had a splicing means which carries out splicing of the 1st coding stream and the 2nd coding stream by which an encoding parameter was changed.
[0042]A coding stream splicing method according to claim 11, A stream analysis step which extracts an encoding parameter of the 1st coding stream by analyzing syntax of the 1st coding stream, Based on an encoding parameter of the 1st coding stream obtained by a stream analysis step, so that the 1st coding stream and 2nd coding stream may be seamlessly connected in a splicing point, An encoding parameter of the 2nd coding stream was changed and it had a splicing step which carries out splicing of the 1st coding stream and the 2nd coding stream by which an encoding parameter was changed.
[0043]The coding stream generating device according to claim 21, A stream analysis means to extract an encoding parameter of the 1st coding stream by analyzing syntax of the 1st coding stream, Based on an encoding parameter of the 1st coding stream obtained by a stream analysis means, so that the 1st coding stream and 2nd coding stream may be seamlessly connected in a splicing point, An encoding parameter of the 2nd coding stream was changed and it had a splicing means which carries out splicing of the 1st coding stream and the 2nd coding stream by which an encoding parameter was changed.
[0044]The coding stream generation method according to claim 22, A stream analysis step which extracts an encoding parameter of the 1st coding stream by analyzing syntax of the 1st coding stream, Based on an encoding parameter of the 1st coding stream obtained by a stream analysis step, so that the 1st coding stream and 2nd coding stream may be seamlessly

connected in a splicing point, An encoding parameter of the 2nd coding stream was changed and it had a splicing step which carries out splicing of the 1st coding stream and the 2nd coding stream by which an encoding parameter was changed.
[0045]written this invention is characterized by it having been alike and comprising the following at claim 23.
A reception means which receives data.
An exchange means to replace with other data some data received by a reception means.
An encoding means which codes other data.
An alteration means which changes data received by a reception means so that other data and consistency can be taken.

[0046]written this invention is characterized by it having been alike and comprising the following at claim 27.
A receiving step which receives data.
An exchange step which replaces with other data some data received at a receiving step.
A coding step which codes other data.
A change step which changes data received at a receiving step so that other data and consistency can be taken.

[0047]In a coding stream splicing device of claim 1, and a coding stream generating device of claim 21, A stream analysis means to extract an encoding parameter of the 1st coding stream by analyzing syntax of the 1st coding stream, Based on an encoding parameter of the 1st coding stream obtained by a stream analysis means, so that the 1st coding stream and 2nd coding stream may be seamlessly connected in a splicing point, By changing an encoding parameter of the 2nd coding stream and having a splicing means which carries out splicing of the 1st coding stream and the 2nd coding stream by which an encoding parameter was changed, Seamless splicing processing which a locus of a data occupation rate of a VBV buffer of a stream by which splicing was carried out is continuation, and does not carry out VBV buffer ****** is realizable. According to this invention, stream structure of a coding stream before and behind a splicing point can realize splicing processing which can generate a seamless stream which was able to take compatibility which does not become discontinuous.
[0048]In a coding stream splicing method of claim 11, and a coding stream generation method of claim 22, A stream analysis step which extracts an encoding parameter of the 1st coding stream by analyzing syntax of the 1st coding stream, Based on an encoding parameter of the 1st coding stream obtained by a stream analysis step, so that the 1st coding stream and 2nd coding stream may be seamlessly connected in a splicing point, By changing an encoding parameter of the 2nd coding stream and performing a splicing step which carries out splicing of

the 1st coding stream and the 2nd coding stream by which an encoding parameter was changed, Seamless splicing processing which a locus of a data occupation rate of a VBV buffer of a stream by which splicing was carried out is continuation, and does not carry out VBV buffer ****** is realizable. According to this invention, stream structure of a coding stream before and behind a splicing point can realize splicing processing which can generate a seamless stream which was able to take compatibility which does not become discontinuous.
[0049]In an information processor of claim 23, and an information processing method of claim 27, data is received, some received data is replaced with other data, other data is coded, and received data is changed so that other data and consistency can be taken.
[0050]
[Embodiment of the Invention]Drawing 7 is a figure showing composition for the digital broadcasting system containing the coding stream splicing device concerning an embodiment of the invention.
[0051]Generally the digital broadcasting system comprises the main station (Keystation) 30 and the local station 40 of this main station series as shown in drawing 7.
[0052]To the local station of a series, the main station 30 is a common television program a broadcasting station for making and transmitting, and The broadcast system controller 31, It comprises the raw material server 32, the CM server 33, the matrix switcher block 34, the MPEG encoder block 35, the multiplexer 36, and the modulation circuit 37.
[0053]The broadcast system controller 31, It is a system which manages and controls all the devices and circuits which are established in the broadcasting station of the raw material server 32, the CM server 33, the matrix switcher block 34, the MPEG encoder block 35, the multiplexer 36, and the modulation circuit 37 grade integrative. The programming table for this broadcast system controller 31 to manage the televising time of all raw materials, such as program materials created by the program materials and the promotion raw material which were supplied from the program supplier, or the local station, and CM raw material, is registered, The program organization system 1 controls each device and circuit which were mentioned above according to this programming table. This programming table comprises an event information file on which the program schedule of one time basis or an one-day unit is recorded, an operation information file on which the time schedule of the program of 15 second bits is recorded, etc., for example.
[0054]The raw material server 32 stores the video data and audio information which are broadcast as this editing of a TV program, such as a movie program, a sports program, an entertainment program, and a news program, and. It is a server for outputting the program specified by the broadcast system controller 31 to the timing according to the time schedule of the programming table. This movie program is the video data changed into the television signal which has the frame frequency of 30 Hz by carrying out 2:3 pulldown processing from the film

stock which has the frame frequency of 24 Hz, as explained previously. The video data and audio information which were outputted as a program of this editing from this raw material server 32 are supplied to the matrix switcher block 34. For example, in the example shown in drawing 2, the program 1, the program 2, the program 3, and the program 4 grade are recorded on this raw material server 32. The video data and audio information which are memorized by this raw material server 32 are the video data and audio information of baseband by which compression encoding is not carried out.

[0055]The CM server 33 stores the commercials inserted between the programs edited by the book reproduced from the raw material server 32, and it is a server for outputting the commercials specified by the broadcast system controller 31 to the timing according to the time schedule of the programming table. The video data and audio information which were outputted as commercials from this CM server 33 are supplied to the matrix switcher 34. For example, in the example shown in drawing 2, commercial CM1, commercial CM2, and commercial CM3 grade are recorded on this CM server 33. The video data and audio information which are memorized by this CM server 33 are the video data and audio information of baseband by which compression encoding is not carried out.

[0056]The matrix switcher block 34 has a matrix circuit which carries out routing of live programs, such as a sport relay broadcast and a news program, this editing program outputted from the raw material server 32, and the commercial program outputted from the CM server 33, respectively. The matrix switcher block 34, It has a switching circuit which connects and switches this editing program supplied from the raw material server 32, and the commercial program supplied from the CM server 33 to the timing according to the time schedule of the programming table determined by the broadcast system controller. By this switching circuit, transmission program PGOLD shown, for example in drawing 2 is generable by switching this editing program and CM program.

[0057]The MPEG encoder block 35 is a block for coding the video data and audio information of baseband which were outputted from the matrix switcher block based on an MPEG 2 standard, and has two or more video encoders and audio encoders.

[0058]The multiplexer 36 multiplexes the transport stream of nine channels outputted from the MPEG encoder block 35, and generates one multiplexing transport stream. Therefore, in the multiplexing transport stream outputted. The transport stream packet having contained the coding video elementary stream up to one to nine channels, and the transport stream packet having contained the coding audio elementary stream from one channel to nine channels. It is the stream which is ******(ing).

[0059]The modulation circuit 37 carries out QPSK modulation of the transport stream, and transmits the modulated data to the local station 40 and the home 61 via a transmission line.

[0060]Next, the entire configuration of the local station 40 is explained with reference to

drawing 7.
[0061]The local station 40 has the following.
TV program ** which edited the sent common television program for districts, and was edited for districts from the head office -- each home -- televising -- it is a broadcasting station of dried cuttlefish -- the broadcasting system coat roller 41.
Demodulator circuit 42.
Demultiplexer 43.
The stream conversion circuit 44, the raw material server 46, the CM server 47, the encoder block 48, the stream server 49, the stream splicer 50, the stream conversion circuit 51, the multiplexer 52, and the modulation circuit 53.

[0062]The broadcast system controller 41 like the broadcast system controller 31 of the head office 30, The demodulator circuit 42, the demultiplexer 43, the stream conversion circuit 44, the raw material server 46, the CM server 47, the encoder block 48, the stream server 49, the stream splicer 50, the stream conversion circuit 51, the multiplexer 52, It is a system which manages and controls all the devices and circuits which are established in the local station of the modulation circuit 53 grade integrative. As opposed to the transmission program which was supplied from the head office 30 like the broadcast system controller 31 in the head office 30 as for this broadcast system controller 41, The programming table for managing the televising time of the edit TV program which inserted the program created by the local station, CM, etc. is registered, and each device and circuit which were mentioned above are controlled according to this programming table.
[0063]The demodulator circuit 42 generates a transport stream by carrying out QPSK demodulation of transmission PIROGURAMU transmitted from the head office 30 via the transmission line.
[0064]The demultiplexer 43 carries out false rumor RUCHIPU REXX of the tolan SUPO toss ream outputted from the demodulator circuit 42, generates the transport stream of nine channels, and outputs the transport stream of each channel to the stream conversion circuit 44. That is, this demultiplexer 43 performs processing that the multiplexer 36 of the head office 30 is reverse.
[0065]The stream conversion circuit 44 is a circuit for changing into the gestalt of an elementary stream the transport stream supplied from the demultiplexer 43.
[0066]The raw material server 46 is a server which stores the video data and audio information which are broadcast as a rural-areas-oriented TV program, such as an entertainment program and a news program. The CM server 47 is a server for storing the video data and audio information of the commercials for districts which are inserted between these editing programs supplied from the head office 30. The video data and audio information which are memorized

by this raw material server 46 and the CM server 47 are the video data and audio information of baseband by which compression encoding is not carried out.

[0067]The encoder block 48 is a block for coding the video data of two or more channels supplied from the raw material server 46 and the CM server 47, and two or more Chillan El's audio information, It has two or more video encoder and two or more audio encoders corresponding to two or more channels. The difference between this encoder block 48 and the MPEG encoder block 35 of the head office 30, Although the MPEG encoder blocks 35 of the head office 30 differ to outputting a transport stream in that the elementary stream I/O of the encoder block 48 of this local station 40 is carried out, The substantial function and processing of this encoder block 48 are completely the same as the MPEG encoder block 35 of the head office 30. The elementary stream for three channels is supplied to the stream server 49 among the elementary streams of two or more channels outputted from the encoder block 48, and the elementary stream of the remaining channels is supplied to the stream splicer 50.

[0068]The stream server 49 receives the elementary stream for three channels supplied from the encoder block, and record on the recording medium in which random access is possible in the state of a stream in the state of a stream, and. following the control from the broadcast system controller 41 -- the elementary stream -- run DAMUA -- it reproduces from the recording medium in which sex is possible.

[0069]The stream splicer 50 carries out routing of two or more EREMENTA leases supplied from the encoder block 48 and the stream server 49, and outputs them to a predetermined output line, and. It is the block for carrying out splicing of the elementary stream supplied from the head office 30, and the elementary stream generated in the local station 40 on a stream level. The processing in this stream splicer 50 is mentioned later in detail.

[0070]The stream conversion circuit 51 is a circuit which receives the elementary stream outputted as a spliced stream from the stream splicer 50, and changes this elementary stream into a transport stream.

[0071]The multiplexer 52 multiplexes the transport stream of nine channels outputted from the stream conversion circuit like the multiplexer 36 of the head office 30, and generates one multiplexing transport stream.

[0072]The modulation circuit 53 carries out QPSK modulation of the transport stream, and distributes the modulated data to each home 62 via a transmission line.

[0073]Drawing 8 is a block diagram for explaining the composition of the MPEG encoder block 35 of the head office 30, and the encoder block 48 of the local station 40 in detail. Since the MPEG encoder block 35 of the head office 30 and the encoder block 48 of the local station 40 are the same composition substantially, the MPEG encoder block 35 of the head office 30 is mentioned as an example, and the composition and yesterday are explained.

[0074]The MPEG encoder block 35 is provided with the following.

The encoder controller 350 for controlling intensively all the circuits of this MPEG encoder block 35.
Two or more MPEG video encoder 351-1V for encoding supplied video data of two or more channels - 351-9V.
MPEG audio encoder 351-1A for coding two or more audio information which corresponds to a video data, respectively based on an MPEG 2 standard - 351-9A.

[0075]The MPEG encoder block 35, Stream conversion circuit 352-1V which changes into transport stream coding elementary stream (ES) outputted, respectively from each video encoder 351-1V - 351-9V - 352-9V, Stream conversion circuit 352-1A which changes into a transport stream the coding elementary stream (ES) outputted, respectively from each audio encoder 351-1A - 351-9A - 352-9A, The transport stream having contained the video elementary stream of the 1st channel (1ch), The multiplexer 353-1 which multiplexes the transport stream having contained the audio elementary stream of the 1st channel (1ch) per transport stream packet, The transport stream having contained the video elementary stream of the 2nd channel (2ch), The multiplexer 353-2 which multiplexes the transport stream having contained the audio elementary stream of the 2nd channel (2ch) per transport stream packet, and ...., The transport stream having contained the video elementary stream of the 9th channel (9ch), It has the multiplexer 353-9 which multiplexes the transport stream having contained the audio elementary stream of the 9th channel (9ch) per transport stream packet.
[0076]Although the MPEG encoder block 35 shown in drawing 8 has composition which encodes the transmission program of nine channels, it cannot be overemphasized that not only nine channels but it may be what channel.
[0077]The MPEG encoder block 35 shown in drawing 8 performs control called statistics multiplex [to which the transmission rate of the transmission program of each channel is dynamically changed according to the pattern of the video data to code]. The technique of this statistics multiplex is comparatively simple for the pattern of the picture of the transmission program of a certain channel, It is a case where so many bits are not needed in order to code this picture, in order that the pattern of the picture of other programs may be comparatively difficult and may code this picture on the other hand -- many bits -- necessity -- **, when like, It is the method of carrying out which will make the transmission rate of a transmission line efficient by assigning the bit for coding the picture of a certain chain flannel to the bit which codes the picture of other channels. How to change the encoding rate of each video encoder to below dynamically in this way is explained briefly.
[0078]Each video encoder 351-1V - 351-9V, First, from statistics values obtained as a result of the motion compensation performed before coding processing, such as the motion compensation remainder and Intra AC. Difficulty data (Difficulty Data) D1 which shows how

much bit quantity is required in order to code the picture used as a coding subject - D9 are generated. This difficulty data is information which shows coding hardness, It expresses that that a difficulty is large has a complicated pattern of the picture used as a coding subject, and expresses that it is simple for the pattern of the picture used as a coding subject for a difficulty to be small. This difficulty data can be estimated based on statistics values used at the time of the coding processing in a video encoder, such as Intra AC and the motion compensation remainder (ME remainder).

[0079]The encoder controller 350 receives the difficulty data D1-D9 outputted, respectively from each video encoder 351-1V - 351-9V, Based on those difficulty data D1-D9, the target bit rates R1-R9 to each video encoder 351-1V - 351-9V are calculated, respectively. As shown in the following formulas (1), specifically, the encoder controller 350 can ask for the target bit rates R1-R9 by distributing total transmission rate Total_Rate of a transmission line proportionally using the difficulty data D1-D9.

Ri = (Di/ sigma Dk) x Total_Rate ... (1)

[0080]"Ri" in a formula (1) The target bit rate of the transmission program of the "i" channel, Difficulty data for "Di" to code the picture of the transmission program of the "i" channel and "sigma" mean total of the difficulty data of k= 1-9 channels.

[0081]The encoder controller 350 supplies the target bit rates R1-R9 calculated based on the formula (1) to corresponding, respectively video encoder 351-1V - 351-9V. The unit which calculates these target bit rates R1-R9 may be every picture, and may be GOP units.

[0082]Video encoder 351-1V - 351-9V receives the target bit rates R1-R9 supplied from the encoder controller 350, respectively, and it performs coding processing so that it may correspond to these target bit rates R1-R9. By changing dynamically the bit rate of the coding stream outputted from each video encoder based on the difficulty data in which the coding hardness of the picture coded in this way is shown, The optimal quantity of a bit can be assigned to the coding hardness of the picture which should be coded, and the total amount of the bit rate outputted from each video encoder, respectively does not overflow total transmission rate Total_Rate of a transmission line further.

[0083]Both stream conversion circuit 352-1V - 352-9V [and], stream conversion circuit 352-1A and - 352-9A are the circuits for changing an elementary stream into a transport stream.

[0084]With reference to drawing 9, code the supplied source video data in video encoder 351-1V, and a video elementary stream is generated, The example which changes the video elementary stream into a transport stream in stream conversion circuit 352-1V is given, and the process in which a transport stream is generated from a video elementary stream is explained.

[0085]Drawing 9 (A) is shown and the source video data supplied to video encoder 351-1V drawing 9 (B), The video elementary stream (ES) outputted from video encoder 351-1V is

shown, drawing 9 (C) shows a PAKERRAIZUDO elementary stream (PES), and drawing 9 (D) shows the transport stream (TS).

[0086]Like the stream V1 shown in drawing 9 (B), V2, V3, and V4, the data volume of the elementary stream coded in the MPEG 2 standard differs according to the picture type (I picture, P picture, or B picture) of a video frame, and the existence of a motion compensation. The PAKETTAIZUDO elementary stream (PES) shown in drawing 9 (C) packet-izes two or more of the elementary streams, and is generated by adding a PES header to the head. For example, 24 which shows the start of a PES packet to this PES header 8 which shows the classification (for example, classification, such as video and a sound) of the stream data accommodated in the packet start code of [bit], and the live-data portion of a PES packet 16 which indicates the length of the data which continues henceforth to be stream ID of [bit] 8 which shows the length of the data of the packet length of [bit], the coded data which shows the value "10", the flag control part in which various flag information is stored, and a conditional coding part The time-of-day-control information at the time of decoding called the PES header length of [bit], and the hour entry of the reproducing output called PTS (Presentation Time Stamp) and DTS (Decoding Time Stamp), Or it is constituted by the variable-length conditional coding part in which the stuffing bytes for data volume adjustment, etc. are stored.

[0087]A transport stream (TS) is a data row of the transport stream packet which comprises 4 bytes of TS header, and the payload part on which 184 bytes of live data are recorded. In order to generate this transport stream packet (TS packet), First, the data stream of a PES packet is decomposed every 184 bytes, 184 bytes of the live data are inserted in the payload part of a TS packet, and a transport stream packet is generated by adding 4 bytes of TS header to data with a pay load [the] of 184 bytes.

[0088]Next, with reference to drawing 17, the syntax and structure of an elementary stream are explained from drawing 10, and the syntax and structure of a transport stream are explained in detail with reference to drawing 19 from drawing 18.

[0089]Drawing 10 is a figure showing the syntax of the video elementary stream of MPEG. Each video encoder 351-1V within the video encoder block 35 - 3519V generates the coding elementary stream according to the syntax shown in this drawing 10. In the syntax explained below, a function and a conditional sentence are expressed with a thin printing type, and the data element is expressed with ******. The data item is described by the mnemonic (Mnemonic) who shows the name, bit length, and its type and transmitting order.

[0090]First, the function currently used in the syntax shown in this drawing 10 is explained. Actually, the syntax shown in this drawing 10 is syntax used in order to extract meaningful predetermined data from the coding stream transmitted to the video decoder side. The syntax used for the video encoder side is the syntax which omitted conditional sentences, such as a part for if, and a while sentence, from the syntax shown in drawing 10.

[0091]The next_start_code() function first described in video_sequesce() is a function for looking for the start code described in the bit stream. The data element defined by the sequence_header() function and the sequence_extension() function is first described by the coding stream generated according to the syntax shown in this drawing 6. This sequence_header() function, It is a function for defining the header data of the sequence layer of an MPEG bit stream, and a sequence_extension() function is a function for defining the extended data of the sequence layer of an MPEG bit stream.
[0092]The do{}while syntax arranged after the sequence_extension() function, {} of do [while the conditions defined by the while sentence are truth] sentence -- it is the syntax which shows that the data element described based on the inner function is described in an encoding data stream. The nextbits() function currently used for this while sentence is a function for comparing the bit or bit string described in the bit stream with the data element referred to. In the example of the syntax shown in this drawing 6, a nextbits() function, When sequence_end_code which shows the bit string in a bit stream and the end of a video sequence is compared and the bit string and sequence_end_code in a bit stream are not in agreement, the conditions of this while sentence serve as truth. Therefore, the do{}while syntax arranged after the sequence_extension() function, While sequence_end_code which shows the end of a video sequence in a bit stream does not appear, it is shown that the data element defined by the function in do sentence is described in encoded bit streams.
[0093]In encoded bit streams, the data element defined by the extension_and_user_data (0) function is described by the next of each data element defined by the sequence_extension() function. This extension_and_user_data (0) function is a function for defining the extended data and the user datum in a sequence layer of an MPEG bit stream.
[0094]The do{}while syntax arranged after this extension_and_user_data (0) function, {} of do [while the conditions defined by the while sentence are truth] sentence -- the data element described based on the inner function is a function which shows what is described by the bit stream. The nextbits() function currently used in this while sentence, that it is a function for judging coincidence with the bit or bit string which appears in a bit stream, and picture_start_code or group_start_code, When the bit or bit string which appears in a bit stream, and picture_start_code or group_start_code is in agreement, the conditions defined by the while sentence serve as truth. Therefore, when picture_start_code or group_start_code appears in encoded bit streams, this do{}while syntax. It is shown that the code of the data element defined by the function in the start code, next do sentence is described.
[0095]In encoded bit streams, if sentence described by the beginning of this do sentence shows the conditions of the case where group_start_code appears, and is. When it is truth, the conditions by this if sentence in encoded bit streams, The data element defined as the next of this group_start_code by the group_of_picture_header() function and the

extension_and_user_data (1) function is described in order.
[0096]This group_of_picture_header() function, It is a function for defining the header data of the GOP layer of an MPEG coding bit stream, and an extension_and_user_data (1) function is a function for defining the extended data and the user datum of a GOP layer of an MPEG coding bit stream.
[0097]In these encoded bit streams, to the next of the data element defined by the group_of_picture_header() function and the extension_and_user_data (1) function. The data element defined by the picture_header() function and the picture_coding_extension() function is described. Of course, when the conditions of if sentence explained previously do not serve as truth. Since the data element defined by the group_of_picture_header() function and the extension_and_user_data (1) function is not described, To the next of the data element defined by the extension_and_user_data (0) function. The data element defined by the picture_header () function, the picture_coding_extension() function, and the extension_and_user_data (2) function is described.
[0098]This picture_header() function, It is a function for defining the header data of the picture layer of an MPEG coding bit stream, and a picture_coding_extension() function is a function for defining the 1st extended data of the picture layer of an MPEG coding bit stream. An extension_and_user_data (2) function is a function for defining the extended data and the user datum of a picture layer of an MPEG coding bit stream. The user datum defined by this extension_and_user_data (2) function, In [since it is data described by the picture layer and is data which can be described for every picture] this invention, He is trying to describe time code information as an user datum defined by this extension_and_user_data (2) function.
[0099]In encoded bit streams, the data element defined by a picture_data() function is described by the next of the user datum of a picture layer. This picture_data() function is a function for describing the data element about a slice layer and a macro block layer.
[0100]The while sentence described by the next of this picture_data() function is a function for performing conditional judgment of the following if sentence, while the conditions defined by this while sentence are truth. The nextbits() function currently used in this while sentence, It is a function for judging whether picture_start_code or group_start_code is described in encoded bit streams, When picture_start_code or group_start_code is described in the bit stream, the conditions defined by this while sentence serve as truth.
[0101]If it is a conditional sentence for judging whether sequence_end_code is described or not and sequence_end_code is not described in encoded bit streams, the following if sentence, It is shown that the data element defined by the sequence_header() function and the sequence_extension() function is described. Since sequence_end_code is a code which shows the end of the sequence of a coding video stream, Unless a coding stream is completed, in the coding stream, the data element defined by the sequence_header() function and the

sequence_extension() function is described.

[0102]The data element described by this sequence_header() function and the sequence_extension() function, It is completely the same as the data element described by the sequence_header() function described at the head of the sequence of a video stream, and the sequence_extension() function. Thus, the reason for describing the same data in a stream, When reception is started by the bit stream receiving set side from the middle (for example, bit stream portion corresponding to a picture layer) of a data stream, it is for preventing that it becomes impossible to receive the data of a sequence layer, and it becomes impossible to decode a stream.

[0103]The next of the data element defined by the sequence_header() function and sequence_extension() function of this last, That is, 32-bit sequence_end_code which shows the end of a sequence is described by the last of the data stream.

[0104]Below, a sequence_header() function, a sequence_extension() function, An extension_and_user_data (0) function, a group_of_picture_header() function, and an extension_and_user_data (1) function are explained in detail.

[0105]Drawing 11 is a figure for explaining the syntax of a sequence_header() function. The data element defined by this sequence_header() function, sequence_header_code, sequence_header_present_flag, horizontal_size_value, vertical_size_value, aspect_ratio_information, frame_rate_code, bit_rate_value, marker_bit, VBV_buffer_size_value, constrained_parameter_flag, load_intra_quantizer_matrix, They are intra_quantizer_matrix, load_non_intra_quantizer_matrix, non_intra_quantizer_matrix, etc.

[0106]sequence_header_code is data showing the start synchronization code of a sequence layer. sequence_header_present_flag is data in which it is shown whether the data in sequence_header is effective or invalid. horizontal_size_value is data which comprises 12 bits of low ranks of the horizontal pixel number of a picture. vertical_size_value is data which consists of 12 bits of low ranks of the line number of the length of a picture. aspect_ratio_information is data showing the aspect ratio (aspect ratio) or display screen aspect ratio of a pixel. frame_rate_code is data showing the display period of a picture. bit_rate_value is 18 bits (it revalues per 400bsp) of low rank data of the bit rate for the restriction to a generation bit amount. marker_bit is bit data inserted in order to prevent a start code emulation. VBV_buffer_size_value is low rank 10 bit data of the value which determines the size of the virtual buffer for generated code amount control (video buffer verifier). constrained_parameter_flag is data in which it is shown that each parameter is less than restriction. load_intra_quantizer_matrix is data in which existence of the quantizing-matrix data for the intra MB is shown. intra_quantizer_matrix is data in which the value of the quantizing matrix for the intra MB is shown. load_non_intra_quantizer_matrix is data in which existence of the quantizing-matrix data for the non-intra MB is shown. non_intra_quantizer_matrix is data

showing the value of the quantizing matrix for the non-intra MB.
[0107]Drawing 12 is a figure for explaining the syntax of a sequence_extension() function. With the data element defined by this sequence_extension() function. extension_start_code, extension_start_code_identifier, sequence_extension_present_flag, profile_and_level_indication, progressive_sequence, chroma_format, horizontal_size_extension, vertical_size_extension, bit_rate_extension, They are data elements, such as vbv_buffer_size_extension, low_delay, frame_rate_extension_n, and frame_rate_extension_d.
[0108]extension_start_code is data showing the start synchronization code of extension data. extension_start_code_identifier is data in which it is shown which extended data is sent. sequence_extension_present_flag is SUDETA which shows whether the data within a sequence extension is effective or invalid. profile_and_level_indication is data for specifying the profile and level of a video data. progressive_sequence is data in which it is shown that a video data is sequential scanning. chroma_format is data for specifying the color difference format of a video data. horizontal_size_extension is top 2-bit data added to horizntal_size_value of a sequence header. vertical_size_extension is top 2-bit data which is a sequence header and which vertical_size_value adds. bit_rate_extension is top 12-bit data added to bit_rate_value of a sequence header. vbv_buffer_size_extension is top 8-bit data added to vbv_buffer_size_value of a sequence header. low_delay is data in which it is shown that B picture is not included. frame_rate_extension_n is data for obtaining a frame rate combining frame_rate_code of a sequence header. frame_rate_extension_d is data for obtaining a frame rate combining frame_rate_code of a sequence header.
[0109]Drawing 13 is a figure for explaining the syntax of an extension_and_user_data(i) function. The data element by which this extension_and_user_data(i) function is defined by an extension_data() function when "i" is except two describes only the data element defined by a user_data() function, without describing. Therefore, an extension_and_user_data (0) function describes only the data element defined by a user_data() function.
[0110]Drawing 14 is a figure for explaining the syntax of a group_of_picture_header() function. The data element defined by this group_of_picture_header() function, It comprises group_start_code, group_of_picture_header_present_flag, time_code, closed_gop, and broken_link.
[0111]group_start_code is data in which the start synchronization code of a GOP layer is shown. It is data in which it is shown whether the data element in group_of_picture_header_present_flag and group_of_picture_header is effective or invalid. time_code is a time code which shows the time from the head of the sequence of the leading picture of GOP. closed_gop is flag data in which a thing with a picture refreshable independently of other GOP(s) in GOP is shown. broken_link is flag data in which it is shown

that B picture of the head in GOP cannot be correctly reproduced because of edit etc.
[0112]It is a function for describing only the data element defined by a user_data() function like an extension_and_user_data (1) function and an extension_and_user_data (0) function.
[0113]Next, the picture_headr() function for describing the data element about the picture layer of a coding stream with reference to drawing 17 from drawing 15, A picture_coding_extension() function, extensions_and_user_data (2), and picture_data() are explained.
[0114]Drawing 15 is a figure for explaining the syntax of a picture_headr() function. The data element defined by this picture_headr() function, picture_start_code, temporal_reference, picture_coding_type, vbv_delay, full_pel_forward_vector, They are forward_f_code, full_pel_backward_vector, backward_f_code, extra_bit_picture, and extra_information_picture.
[0115]Specifically, picture_start_code is data showing the start synchronization code of a picture layer. temporal_reference is data reset at the head of GOP by the number which shows the display order of a picture. picture_coding_type is data in which a picture type is shown.
[0116]vbv_delay is data in which the initial state of a VBV buffer is shown, and is set up for every picture. The picture of the coding elementary stream transmitted to the receiving system from the transmitting side system, It is buffered by the VBV buffer provided in the receiving system, and it is pulled out from this VBV buffer (read), and a decoder is supplied at the time specified by DTS (Decoding Time Stamp). Since the picture for decryption begins to be buffered by the VBV buffer, the time defined by vbv_delay means the time when the picture of a coding subject is pulled out from a VBV buffer, i.e., the time specified by DTS. In the coding stream splicing device of this invention, it is made to realize data occupation rate VBV buffer seamless splicing which does not become discontinuous by using vbv_delay stored in this picture header. It mentions later in detail.
[0117]full_pel_forward_vector is data which the accuracy of a forward direction motion vector shows an integer unit or a half a pixel unit. forward_f_code is data showing a forward direction motion vector search range. full_pel_backward_vector is data which the accuracy of an opposite direction motion vector shows an integer unit or a half a pixel unit. backward_f_code is data showing an opposite direction motion vector search range. extra_bit_picture is a flag which shows existence of the additional information which follows. When this extra_bit_picture is "1", extra_information_picture exists next, and when extra_bit_picture is "0", it is shown that there is no data following this. extra_information_picture is the information reserved in the standard.
[0118]Drawing 16 is a figure for explaining the syntax of a picture_coding_extension() function. With the data element defined by this picture_coding_extension() function. extension_start_code, extension_start_code_identifier, f_code [0], [0], f_code [0] and [1], f_code [1], [0], f_code [1], [1], intra_dc_precision, picture_structure, top_field_first, frame_predictive_frame_dct, concealment_motion_vectors, q_scale_type, intra_vlc_format,

alternate_scan, repeat_firt_field, chroma_420_type, It comprises progressive_frame, composite_display_flag, v_axis, field_sequence, sub_carrier, burst_amplitude, and sub_carrier_phase.

[0119]extension_start_code is a start code which shows the start of the extension data of a picture layer. extension_start_code_identifier is a code which shows which extended data is sent. f_code [0] and [0] are data showing the level motion vector search range of the direction of FOADO. f_code [0] and [1] are data showing the vertical motion vector search range of the direction of FOADO. f_code [1] and [0] are data showing the level motion vector search range of the backward direction. f_code [1] and [1] are data showing the vertical motion vector search range of the backward direction. intra_dc_precision is data showing the accuracy of a DC coefficient. picture_structure is data in which a frame structure or a field structure is shown. In the case of a field structure, they are the higher rank field, the low rank field, or data set and shown.

[0120]top_field_first is a flag which shows whether the first field is a top field and whether it is a bottom field in the case of a frame structure. frame_predictive_frame_dct is data in which it is shown in the case of a frame structure that prediction of frame mode DCT is only a frame mode. concealment_motion_vectors is data in which it is shown that the motion vector for concealing a transmission error is attached to the Intra macro block. q_scale_type is data in which it is shown whether a linear quantization scale is used or a nonlinear quantization scale is used. intra_vlc_format is data in which it is shown whether another two-dimensional VLC is used for the Intra macro block. alternate_scan is data showing selection of whether a zigzag scan is used or to use an alternate scan.

[0121]In [are a flag which shows whether repeat_first_field generates a repeat field at the time of decryption, and] the processing at the time of decryption, When repeat_first_field is "1", a repeat field is generated, and when repeat_first_field is "0", processing in which a repeat field is not generated is performed. When the signal format of chroma_420_type is 4:2:0, they are the same value as following progressive_frame, and data which expresses 0 when that is not right. progressive_frame is data in which it is shown whether this picture can be scanned sequentially. composite_display_flag is data in which it is shown whether the source signal was a composite signal. v_axis is data in which a source signal is used in the case of PAL. field_sequence is data in which a source signal is used in the case of PAL. sub_carrier is data in which a source signal is used in the case of PAL. burst_amplitude is data in which a source signal is used in the case of PAL. sub_carrier_phase is data in which a source signal is used in the case of PAL.

[0122]An extension_and_user_data (2) function, As shown in drawing 13, when extension start code extension_start_code exists in encoded bit streams, the data element defined by an extension_data() function is described. However, it is a extension_data() function when an

extension start code does not exist in a bit stream. The data element defined is not described in the bit stream. In the next of the data element defined by this extension_data() function. When user-datum start code user_data_start_code exists in a bit stream, the data element defined by a user_data() function is described.

[0123]Drawing 17 is a figure for explaining the syntax of a picture_data() function. The data element defined by this picture_data() function is a data element defined by a slice() function. However, when slice_start_code which shows the start code of a slice() function does not exist in a bit stream, the data element defined by this slice() function is not described in the bit stream.

[0124]A slice() function is the data element about a slice layer a function for describing, and specifically, slice_start_code, slice_quantiser_scale_code, intra_slice_flag, intra_slice, reserved_bits, It is a function for describing data elements, such as extra_bit_slice, extra_information_slice, and extra_bit_slice, and the data element defined by a macroblock() function.

[0125]slice_start_code is a start code which shows the start of the data element defined by a slice() function. slice_quantiser_scale_code is data in which the quantization step size set up to the macro block which exists in this slice layer is shown. However, when quantiser_scale_code is set up for every macro block, it is used by the data of macroblock_quantiser_scale_code set up to each macro block, giving priority. intra_slice_flag is a flag which shows whether intra_slice and reserved_bits exist in a bit stream. intra_slice is data in which it is shown whether a non Intra macro block exists in a slice layer. When either of the macro blocks in a slice layer is a non Intra macro block, intra_slice is set to "0", and intra_slice is set to "1" when all the macro blocks in a slice layer are non Intra macro blocks. reserved_bits is 7-bit data and takes the value of "0." extra_bit_slice is a flag which shows that additional information exists as a coding stream, and when extra_information_slice next exists, it is set as "1." When additional information does not exist, it is set as "0."

[0126]A macroblock() function is the data element about a macro block layer a function for describing, and specifically, Data elements, such as macroblock_escape, macroblock_address_increment, and macroblock_quantiser_scale_code, They are a macroblock_modes() function and a function for describing the data element defined by macroblock_vecters (s) function.

[0127]macroblock_escape is a fixed bit string which shows whether the horizontal difference of a reference macroblock and a front macro block is 34 or more. When the horizontal difference of a reference macroblock and a front macro block is 34 or more, 33 is added to the value of macroblock_address_increment. macroblock_address_increment is data in which the horizontal difference of a reference macroblock and a front macro block is shown. If one macroblock_escape exists before this macroblock_address_increment, The value which added

33 to the value of this macroblock_address_increment serves as data in which the horizontal difference of a actual reference macroblock and a front macro block is shown. macroblock_quantiser_scale_code is the quantization step size set up for every macro block. Although slice_quantiser_scale_code which shows the quantization step size of a slice layer is set to each slice layer, When macroblock_quantiser_scale_code is set up to the reference macroblock, this quantization step size is chosen.

[0128]Next, with reference to drawing 18 and drawing 19, the structure of a transport stream packet and the syntax of a transport stream packet are explained in detail.

[0129]The transport stream packet comprises 4 bytes of a header, and 184 bytes of a payload part for storing various kinds of data and data elements.

[0130]The header unit of a transport stream packet, sync_byte, transport_error_indicator, payload_unit_start_indicator, transport_priority, It comprises the various fields, such as PID, transport_scrambling_control, adaptation_field_control, continuity_counter, and adaptation_field.

[0131]sync_byte is the 8-bit field of the immobilization for detecting an alignment pattern out of a bit stream. The value can detect a synchronization by defining as the fixed value of '01000111' (Ox47) and detecting this bit pattern in this stream.

[0132]When transport_error_indicator is set as "1" which is a 1-bit flag, it shows that at least 1-bit bit error which cannot be corrected exists in a transport stream packet.

[0133]payload_unit_start_indicator is a 1-bit flag. It is data which has a normative meaning to the transport stream packet which transmits elementary data or program specification information (PSI), including video/audio information. When the pay load of a transport stream packet contains elementary data, payload_unit_start_indicator has a meaning of the following. When payload_unit_start_indicator is "1", It is shown that elementary data is inserted in the beginning of the pay load of this transport stream packet, When payload_unit_start_indicator is "0", it is shown that elementary data is not inserted in the beginning of the pay load of this transport stream packet. When payload_unit_start_indicator is set to "1", it is shown that only one PES packet begins by arbitrary transport stream packets. On the other hand, when the pay load of a transport stream packet contains PSI data, payload_unit_start_indicator has a meaning of the following. payload_unit_start_indicator is set to "1" when a transport packet transmits the 1st byte of a PSI section. payload_unit_start_indicator is set to "0" when the transport stream packet is not transmitting the 1st byte of a PSI section. payload_unit_start_indicator is set to "0" also when transport stream packets are null packets.

[0134]transport_priority is a 1-bit identifier which shows the priority of a transport packet. If this transport_priority is set as "1", this transport packet is a packet with the same packet identifier PID, and shows that a priority is higher than the packet in which this transport_priority is not "1." For example, a priority can be given in one elementary stream by setting up the packet

identifier of this transport_priority at arbitrary packets.
[0135]transport_scrambling_control is 2-bit data in which the scrambling mode of a transport stream packet pay load is shown. Scrambling mode is the mode for the kind of SUKURAMBU [the data stored in the bay load] and its SUKURANGURU to be shown. A transport stream packet header and the ADABUTESHON field are standardized so that scramble may not be carried out by the scramble key Ks. Therefore, it can be judged whether the scramble of the data stored in the transport stream packet pay load is carried out by this transport_scrambling_control.
[0136]adaptation_field_control is 2-bit data in which it is shown that the adaptation field and/or a pay load come to the packet header of this transport stream. When only payload data are arranged at a packet header, specifically, When this adaptation_field_control is set to "01" and only the adaptation field is arranged at a packet header, This adaptation_field_control is set to "10", and this adaptation_field_control is set to "11" when the adaptation field and a pay load are arranged at a packet header.
[0137]A packet with the same PID to which continuity_counter was transmitted continuously is lack or data to be thrown away and for whether it is **** to be shown in part in the middle of transmission. Specifically, continuity_counter is the 4-bit field which has the same PID and which increases for every transport stream packet. However, when this contimlty_comter counts, it is a case where the ADAMUTESHON field is arranged at the packet header.
[0138]adaptation_field() is the field for inserting additional information, stuffing bytes, etc. about an individual stream as an option. By this adaptation field, all the information about the dynamic change of state of an individual stream can be transmitted together with data.
[0139]Drawing 19 is a figure for explaining the syntax of adaptation_field(). This adaptation_field(), adaptation_field_length, discontinuity_counter, randam_access_indicator, elemntary_stream_priority_indicator, OPCR_flag, splicing_point_flag, transport_private_data_flag, adaptation_field_extension_flag, program_clock_reference (PCR), original_program_clock_reference (OPCR), splice_countdown, transport_private_data_length, private_data, adaptation_field_extension_length, It comprises the various fields, such as ltw_flag (leagal_time_window_flag), piecewise_rate_flag, and seamless_splice_flag.
[0140]adaptation_field_length is data in which the number of bytes of the adaptation field following the next of this adaptation_field_length is shown. When adaptation_field_control is "11", adaptation_field_length is 0 to 182 bits, and adaptation_field_length will be 183 bits when adaptation_field_control is "10." When there is only no elementary stream which fills the pay load of a transport stream, the stuffing processing for filling a bit is needed.
[0141]discontinuity_counter is data in which it is shown whether a system clock reference (SCR) is reset and the system clock reference is discontinuous in the middle of two or more packets which have the same PID. When a system clock reference is discontinuous, this

discontinuity_counter is set to "1", and this discontinuity_counter is set to "0" when the system clock reference is continuing. This system clock reference is the reference information for setting it as the timing which meant the value of the system time clock by the side of a decoder to the encoder side in an MPEG decoder for video and an audio to decode.

[0142]randam_access_indicator is data in which the beginning of the sequence header of video or the frame of an audio is shown. That is, this randam_access_indicator is data for that it is an access point (the beginning of a frame) of video or an audio to be shown, when performing the random access of a data element.

[0143]In the packet which has the same PID, elemntary_stream_priority_indicator is data in which the priority of the elementary stream data transmitted in the pay load of this transport stream packet is shown. For example, elemntary_stream_priority_indicator is set to "1" when intra coding of the video data is carried out [the elementary stream] for the video data. elemntary_stream_priority_indicator of the transport stream having contained the video data by which inter encoding is carried out is set to "0" to it.

[0144]PCR_flag is data in which it is shown whether PCR (program_clock_refrence) data exists in the adaptation field, and is **. When PCR data exists in the adaptation field, PCR_flag is set to "1", and PCR_flag is set to "0" when PCR data does not exist. This PCR data is data used in order to obtain the timing of decoding which decodes the transmitted data in the decoder of a receiver end.

[0145]OPCR_flag is data in which it is shown whether OPCR (original_program_clock_refrence) data exists in the adaptation field, and is **. When OPCR data exists in the adaptation field, OPCR_flag is set to "1", and OPCR_flag is set to "0" when OPCR data does not exist. This OPCR data is data used for that when one transport stream is reconstructed from two or more original transport streams by spline SHINGU processing etc., It is data showing the PCR data of a certain original transport stream.

[0146]splicing_point_flag is data in which it is shown whether splice_countdoun for the edit point (splice point) in a transport level to be shown exists in the adaptation field. When splice_countdoun exists in the adaptation field, This splicing_point_flag is "1", and this splicing_point_flag is "0" when splice_countdoun exists in the adaptation field.

[0147]transport_private_data_flag is data for whether the private life for describing arbitrary user data exists in the adaptation field to be shown. When private life exists in the adaptation field, This transport_private_data_flag is set to "1", and this transport_private_data_flag is set to "0" when private life does not exist in the adaptation field.

[0148]adaptation_field_extension_flag is data for whether extended field existence is recognized to be shown in the adaptation field. When an extended field exists in the adaptation field, This adaptation_field_extension_flag is set to "1", and this adaptation_field_extension_flag is set to "0" when an extended field does not exist in the adaptation field.

[0149]program_clock_reference (PCR) is a reference clock referred to when synchronizing the phase of the clock of a receiver end to the phase of the transmitting side and a clock. The time when the transport packet was generated is stored in this PCR data. This PCR is data which comprises 42 bits of 33 bits program_c1 ock_reference_base and 9-bit program_clocLreference_extension. By the carry at the time of counting the system clock to 0-299, and being reset by program_clocLreference_extension from 299 to 0. By adding 1 bit to program_c1 ock_reference_base, 24 hours is countable.
[0150]original_program_clock_reference (OPCR) is data used when the transport stream of a single program is reconstructed from a certain transport stream. When a single programed lance boat stream is reconstructed thoroughly, this original_program_clock_reference is copied to program_clock_reference.
[0151]splice_countdown is data in which the number of the packets to the point (splicing processing is possible) which can be edited by a transport stream packet level is shown in the transport stream packet of the same PID. Therefore, in the transport stream packet of the splicing point which can be edited, splice_countdown is "0." By the transport packet from which splice_countdown is set to "0", the splicing processing of the last byte of a transport stream packet pay load is attained by considering it as the byte of the last of the coded picture.
[0152]This splicing processing is processing which connects two different elementary streams performed on a transport level, and generates one new transport stream. And it can divide into the seamless splice which does not generate the discontinuity of decoding, and the non seamless splice which causes the discontinuity of decoding as splicing processing. The decoding time of the access unit of the stream newly connected back when the discontinuity of numerals was not generated, it being shown that there is no inconsistency of the decoding time of the access unit of the old stream in front of a splice and a between, and generating the discontinuity of numerals, It is shown to the decoding time of the access unit of the stream connected back newly that inconsistency of the decoding time of the access unit of the old stream in front of a splice arises.
[0153]transport_private_data_length is data in which the number of bytes of the ply date data in the adaptation field is shown.
[0154]private_data is the field which is not prescribed by the standard in particular but can describe arbitrary user data in the adaptation field.
[0155]adaptation_field_extension_length is data in which the data length of the adaptation field extension in the adaptation field is shown.
[0156]ltw_flag (leagal_time_window_flag) is data in which it is shown whether ltw_offset which shows the offset value of a display window in the adaptation field exists.
[0157]piecewise_rate_flag is data in which it is shown whether piecewise_rate exists in the adaptation field.

[0158]seamless_splice_flag is data in which it is shown whether a splicing point is a usual splicing point and seamless splicing point. When this seamless_splice_flag is "0", It is shown that a splicing point is the usual splicing point, and when this seamless_splice_flag is "1", it is shown that a splicing point is a seamless SUPUISHINGU point. The usual splicing point is a case where a splicing point exists in a pause of a PES packet, It is a case where the transport packet which the splicing packet in front of this splicing point is completed by an access unit, and has the same following PID has begun by the header of a PES packet. With on the other hand, a seamless splicing point. The decoding time of the access unit of the stream which is a case where there is a splicing point in the middle of a PES packet, and was connected back newly, In order to make it there be no inconsistency between the decoding time of the access unit of the old stream in front of a splice, it is a case where a part of old characteristic of a stream is used as the characteristic of a new stream.
[0159]Next, the splicing processing which carries out splicing of the stream STNEW generated in the stream STOLD and the local station 40 which were transmitted from the head office 30, and which came is explained with reference to drawing 23 from drawing 20.
[0160]Drawing 20 is the figure which left two or more channels of only one certain channel, and omitted other channels, in order to explain more nearly plainly control of the local station 40 which explained in drawing 7. In this invention, it has an example about three splicing processings as an example about splicing processing. Below, the example about the 1st, 2nd, and 3rd splicing processings is described in order.
[0161]The example about the 1st splicing processing, Before coding stream STOLD of a transmission program is transmitted from the head office 30, it is an example about the splicing processing performed when coding stream STNEW of commercial CM' inserted newly is already generated. That is, it is a case where it is already beforehand coded by the coding stream STOLD portion of commercial CM in a transmission program, and the stream of commercial CM1' is inserted in it. Usually, since it is broadcast repeatedly, if commercials code the video data of commercials at every time, it is not efficient. Then, the video data of rural-areas-oriented commercial CM1' is coded, and the coding stream TSNEW is beforehand memorized to the stream server 49. And when coding stream STOLD of commercial CM1 replaced from the head office 30 has been transmitted, The processing which codes the same commercials repeatedly can be excluded by reproducing coding stream STNEW of rural-areas-oriented commercial CM1' from this stream server 49. In such a case, 1st splicing processing explained concretely below is performed.
[0162]First, in the local station 40, commercial CM1' for the districts transposed to the portion of commercial CM1 of a transmission program is coded, and the initial processing which stores coding stream STNEW in the stream server 49 is explained. The broadcast system controller 41 controls the CM server 47 to reproduce the video data of commercial CM1' transposed to

the portion of commercial CM of a transmission program. And the encoder 481 receives the video data of the baseband reproduced from the CM server 47, and supplies the coding hardness (Difficulty) Di of each picture of this video data to the encoder controller 480. Like the encoder controller 350 explained in drawing 8, the encoder controller 480 supplies the target bit rate Ri to the encoder 481 so that the encoder 481 may generate a suitable encoded bit. The encoder 481 can generate the coding elementary stream STNEW of the optimal bit rate by performing coding processing based on the target bit rate Ri supplied from the encoder controller 480. The coding elementary stream STNEW outputted from the encoder 481 is supplied to the stream server 49. The stream server 49 records a coding elementary stream on the recording medium in which random access is possible with the state of a stream. The initial processing which stores coding stream STNEW in the stream server 49 now is ended.

[0163]Next, the splicing processing which carries out splicing of coding stream STOLD of the transmission program transmitted from the head office and the coding stream STNEW stored in the stream server 49 by the initial processing mentioned above is explained.

[0164]Transmitted coding stream STOLD is changed into the form of an elementary stream from the form of a transport stream in the stream conversion circuit 44 from the head office 30. Coding stream STOLD changed into the form of the elementary stream is supplied to the stream splicer 50.

[0165]The stream splicer 50 is provided with the splice controller 500, the switching circuit 501, the stream analysis circuit 502, the stream processor 503, and the splicing circuit 504 as shown in drawing 20.

[0166]In the example about this 1st splicing processing, the splice controller 500 switches the input terminal of the switching circuit 501 to "a", and supplies the elementary stream STNEW supplied from the stream server 49 to the stream analysis circuit 502.

[0167]The stream analysis circuit 502 is a circuit which analyzes the syntax of coding stream STOLD and coding stream STNEW. The stream analysis circuit 502 specifically so that he can understand from the syntax of the coding stream indicated by drawing 10 and drawing 15, By looking for 32-bit picture_start_code described in coding stream STOLD, the place where the information about a picture header was described [be / it / under / stream / setting] is grasped. Next, the stream analysis circuit 502 grasps a picture type by finding picture_coding_type of the triplet which starts 11 bits [of picture_start_code] after, and. vbv_delay of a coding picture can be grasped from 16-bit vbv_delay described by the next of picture_coding_type of this triplet.

[0168]The stream analysis circuit 502 so that he can understand from the syntax of the coding stream indicated by drawing 10 and drawing 15, By looking for 32-bit extension_start_code described in coding stream STOLD and coding stream STNEW, the place where the information about a picture coding extension was described [be / it / under / stream / setting]

is grasped. Next, 1-bit top_field_first the stream analysis circuit 502 was described to be after 25 bits of picture_start_code, The frame structure of a coding picture can be grasped by looking for repeat_first_field described after 6 bits of the top_field_first. For example, when "top_field_first" of a coding picture is "1." It is shown that a top field is the early frame structure in time than a bottom field, and when "top_field_first" is "0", it is shown that a top field is the early frame structure in time than a bottom field. When the flag "top_field_first" in a coding stream is "0" and "repeat_first_field" is "1", It is shown that it is the picture structure that a repeat field is generated from a top field at the time of decryption, Having the picture structure that the flag "top_field_first" in a coding stream is "0", and a repeat field is generated from a bottom field at the time of decryption when "repeat_first_field" is "1" is shown.

[0169]picture_coding_type, vbv_delay, top_field_first, and repeat_first_field which were mentioned above are extracted from a coding stream for every picture, and are supplied to the splice controller 500. The elementary stream STOLD supplied to the stream analysis circuit 502 and the elementary stream STNEW are supplied to the stream processor 503 as the elementary stream STOLD and the elementary stream STNEW as it is.

[0170]The stream analysis circuit 502 is provided with the counter for counting the number of bits of the supplied stream STOLD and the stream STNEW, Based on this counted value and the generation bit amount of each picture, it is made to carry out the simulation of the data residue of a VBV buffer for every picture. The data residue of the VBV buffer for every picture calculated in the stream analysis circuit 502 is also supplied to the splice controller 500. [0171] The stream processor 503 so that the spliced stream STSPL generated by carrying out splicing of the stream STOLD and the stream STNEW may turn into a seamless stream, It is a circuit for changing the stream structure of this stream STOLD and the stream STNEW, a data element, and a flag. Concrete processing of this stream processor 503 is explained with reference to drawing 21.

[0172]The original stream STOLD to which drawing 21 (A) was supplied from the head office 30. Are a shown figure the locus of the data occupation rate of the VBV buffer of the stream STOLD, and drawing 21 (B), Are a shown figure the locus of the data occupation rate of the VBV buffer of the substitution stream STNEW memorized by the stream server 49 and its stream STNEW, and drawing 21 (B), In the splicing points SP1 and SP2, it is a figure showing the locus of the data occupation rate of the VBV buffer of the spliced stream STSPL which carried out splicing of the stream STOLD and the stream STNEW, and its spliced stream STSPL. In drawing 21 (A), DTS (decoding time stamp) is shown and SP1vbv, The 1st splicing point on the locus of the data occupation rate of a VBV buffer is shown, and SP2vbv, The 2nd splicing point on the locus of a VBV buffer data occupation rate is shown, and VO (I6), When picture B5 is pulled out from a VBV buffer, the data volume of the picture I6 buffered on the VBV buffer is shown, and GB (I6), The generation bit amount of the picture I6 is shown, and

VD (I6), The value of vbv_delay of the picture I6 is shown and VO (B7), When the picture I6 is pulled out from a VBV buffer, the data volume of the picture B7 buffered on the VBV buffer is shown, and GB (B11), The generation bit amount of the picture B11 is shown, and VD (I12), The value of vbv_delay of the picture I12 is shown, and VO (I12) shows the data volume of the picture I12 buffered on the VBV buffer, when the picture B11 is pulled out from a VBV buffer. In drawing 21 (B), GB (I6'), The generation bit amount of picture I6' is shown, and VD (I6'), The value of vbv_delay of picture I6' is shown and VO (I6'), The data volume buffered by the VBV buffer of picture I6' in 1st splicing point SP1vbv in VBV is shown, and GB (B11'), a picture -- B -- 11 -- ' -- a generation bit amount -- being shown -- VO (I12') -- VBV -- it can set -- the -- two -- splicing -- a point -- SP -- two -- vbv -- it can set -- a picture -- B -- 12 -- ' -- a VBV buffer -- buffering -- having -- **** -- data volume -- being shown -- **** . In drawing 21 (C), GB (I6"), The generation bit amount of picture I6" by which stream processing was carried out is shown so that the spliced stream STSPL may turn into a seamless stream, and VD (I6"), a picture -- I -- six -- " -- vbv_delay -- a value -- being shown -- GB (B11") -- spliced -- a stream -- STSPL -- being seamless -- a stream -- becoming -- as -- a stream -- processing -- carrying out -- having had -- a picture -- B -- 11 -- " -- a generation bit amount -- being shown -- **** .

[0173]Since the original stream STOLD is a stream coded at the head office 30 and the substitution stream STNEW is a stream coded in the local station 40, The stream STOLD and the stream STNEW are streams coded completely unrelated with each video encoder. That is, the value VD (I6) of vbv_delay of the first picture I6 in the stream STOLD and the value VD (I6') of vbv_delay of the first picture I6' in the stream STNEW are not the same values. That is, in the timing of stream splice point SP1vbv [in / in such a case / a VBV buffer], It will differ in the data occupation rate VO (I6) of VBV HAFFA of the original stream STOLD, and the data occupation rate VO (I6') of the VBV buffer of the substitution stream STNEW.

[0174]That is, in [as it explained in the background art of this invention] splice point SP1, or [that the data occupation rate of the VBV buffer of the stream by which the splice was carried out simply will become discontinuous if the splice of the stream STOLD and the stream STNEW is carried out simply] -- or overflow/underflow will carry out.

[0175]Then, based on the data element extracted from the stream STOLD and the stream STNEW in the stream analysis circuit 502 in the stream splicer 50, In the stream processor 503, stream processing is performed about the stream structure of the supplied stream STOLD and the stream STNEW so that the spliced stream STSPL may turn into a seamless stream in a splice point. The processing is explained below.

[0176]The splice controller 500 as a data element about the stream STOLD, For every picture, picture_coding_type, vbv_delay, Information, including top_field_first, repeat_first_field, etc., the generation bit amount in each picture, and the data occupation rate of the VBV buffer in each picture are received from the stream analysis circuit 502. In drawing 21, for example, the value

of vbv_delay in the picture I6 is expressed as VD (I6), the generation bit amount in the picture I6 is expressed as GB (I6), and the data occupation rate of the VBV buffer in the picture I6 is expressed like VO (I6).

[0177]Next, the processing about the VBV buffer of the splice controller 500 in splice point SP1 and the stream processor 503 is explained.

[0178]First, the value VD (I6) of vbv_delay of the picture [in / in the splice controller 500 / splicing point SP1] I6 of the original stream STOLD, When it is judged that the values VD (I6') of vbv_delay of picture I6' of the substitution stream STNEW differ, Directions are given to the stream processor 503 so that the value of vbv_delay of picture I6' described in the substitution stream STNEW may be rewritten from VD (I6') to VD (I6).

[0179]The stream processor 503 rewrites the value of 16-bit vbv_delay described in the picture header of the substitution stream STNEW from VD (I6') to VD (I6) according to the directions from the splice controller 500.

[0180]The value of vbv_delay in the substitution stream STNEW is only rewritten from VD (I6') to VD (I6) here, Since the generation bit amount of picture I6' is insufficient when it tries to pull out a bit stream from a VBV buffer according to this rewritten vbv_delay, a VBV buffer will carry out underflow. Then, the splice controller 500 the generation bit amount GB (I6') of picture I6' of the substitution stream STNEW, Processing which inserts stuffing bytes to that of picture I6' of the substitution stream STNEW is performed so that it may become the generation bit amount GB (I6") of picture I6" of the seamless spliced stream STSPL. These stuffing bytes are data which comprises dummy bits of "0."

[0181]In order to perform processing which inserts stuffing bytes, the splice controller 500, The generation bit amount GB (I6) received as information about the picture I6 and the picture B7 in the stream STOLD, The data occupation rate VO (I6') of received generation bit amount GB (I6') and a VBV buffer is used as information about picture I6' in the data occupation rate VO (I6) of a VBV buffer, and the stream STNEW, The data volume of the stuffing bytes which should be inserted is calculated. It is based on the following formula (2) and, specifically, is stuffing-bytes SB1. [byte] calculates.

SB1[byte] ={GB(I6")-GB(I6')}/ 8 ={GB(I6)-GB(I6')+VO(B7)-VO (B7')} / 8 ... (2)

[0182]The splice controller 500 controls the stream processor 503 to insert SUTAFINGUBAITO SB1 calculated according to the upper type (2) into the stream STNEW.

[0183]The stream processor 503 describes SUTAFINGUBAITO SB1 in the stream STNEW according to the instructions from the splice controller 500. As a position which describes stuffing bytes in a stream, although the start code front of the picture header of the picture I6 of coding stream STNEW is the most desirable, even if it is before other start codes, it is satisfactory.

[0184]The above is control about the VBV buffer of the splice controller 500 in splice point

SP1, and the stream processor 503.
[0185]Next, the control about the VBV buffer of the splice controller 500 in splice point SP2 and the stream processor 503 is explained.
[0186]Only in splice point SP2, supposing it carries out splicing of the stream STNEW and the stream STOLD, Since the generation bit amount GB (B11') of picture B11' of the last of the stream STNEW is insufficient, it does not become a locus of the data occupation rate of the VBV buffer of the picture I12 of the beginning of the stream STNEW, and continuation. as a result, a VBV buffer -- underflow -- or it will overflow.
[0187]Then, in splice point SP2vbv [in / in the splice controller 500 / a VBV buffer], The generated code amount GB (B11') of picture B11' of the last of the stream STNEW so that it may become the generated code amount GB (11") of picture B11" of drawing 21 (C), so that the locus of a VBV buffer may become continuously, Processing which inserts stuffing bytes into the stream STNEW is performed.
[0188]In order to perform processing which inserts stuffing bytes, the splice controller 500, VO received as information about the picture I12 in the stream STOLD (I12), The generation bit amount GB (B11') of picture 11' of the last of the stream STNEW and the data occupation rate VO (I12') of the VBV buffer of picture 12' of the stream STNEW are used, and the data volume of the stuffing bytes which should be inserted is calculated. Specifically based on the following formula (2), stuffing-bytes SB2 [byte] calculates.
SB2 [byte] = {GB(B11")- GB(B11')}/ 8= {VO(I12') - VO (I12)} / 8 ... (3)
[0189]It can be put in another way as it being a data occupation rate of the VBV buffer about the stream STNEW after pulling out the last picture B11' from a VBV buffer in the data occupation rate VO (I12'), the stream analysis circuit 502 which grasps the locus of VBV by counting the number of bits of the stream STNEW -- easy -- this -- data occupation rate VO (I12') detection can be carried out.
[0190]This splice controller 500 controls the stream processor 503 to insert SUTAFINGUBAITO SB2 calculated according to the upper type (3) into the stream STNEW.
[0191]The stream processor 503 describes SUTAFINGUBAITO SB2 as information about picture B11' of the stream STNEW according to the instructions from the splice controller 500. As a position which describes stuffing bytes in a stream, the start code front of the picture header of picture B11' of coding stream STNEW is the most desirable.
[0192]The above is control about the VBV buffer of the splice controller 500 in splice point SP2, and the stream processor 503.
[0193]With reference to drawing 22, the 1st example of processing about flags, such as top_field_first of the splice controller 500 in splice point SP1 and the stream processor 503 and repeat_first_field, is explained.
[0194]Drawing 22 (A) is the figure showing coding stream STOLD when the TV program

PGOLD is coded with the program 1 and commercial CM1 which were made at the head office 30, and the frame structure of TV program PGOLD which comprises the program 2. drawing 22 -- (-- B --) -- a local station -- 40 -- setting -- making -- having had -- substitution -- commercials -- CM -- one -- ' -- the frame structure -- the -- substitution -- commercials -- CM -- one -- ' -- ** -- having coded -- the time -- a coding stream -- STNEW -- being shown -- **** -- a figure -- it is . Drawing 22 (C) is the figure showing the frame structure when the spliced stream STSPL generated when it substitutes for the original stream STOLD and splicing of the stream STNEW is carried out, and its spliced stream STSPL are decoded.

[0195]top_field_first of each picture of commercial CM1 in the stream STOLD to which the splice controller 500 was supplied from the stream analysis circuit 502, top_field_first of commercial CM1' in the substitution stream STNEW is compared. Since field structure is the same if top_field_first in the stream STOLD and top_field_first in the substitution stream STNEW are in agreement, The processing about flags, such as top_field_first and repeat_first_field, is unnecessary. However, as shown in drawing 22, top_field_first of original commercial CM1 is "0", When top_field_first of substitution commercial CM1' is "1", the problem of discontinuity of the field and duplication which were explained in drawing 6 occurs.

[0196]Then, the stream splicer 50 of this invention, So that the stream of violation of an MPEG stream which the field is missing by splicing processing, or overlaps may not be generated, He is trying to rewrite top_field_first and repeat_first_field of a picture near a splicing point.

[0197]In the example shown in drawing 22, the splice controller 500 controls the stream processor 503 to rewrite repeat_first_field of the picture P3 by which a frame is constituted from the top field T4 and bottom field B4 from 0 to 1. The splice controller 500 so that it may become a seamless stream in splice point SP2, The stream processor 503 is controlled to rewrite repeat_first_field of picture P9' by which a frame is constituted from the top field t10 and the bottom field b11 from 0 to 1. When the splice controller 500 rewrote repeat_first_field of picture P9', Since commercial CM1' shifted only one frame time to original commercial CM1, the stream processor 503 is controlled to delete the picture B13 first displayed on a display in the program 2 out of the stream STOLD.

[0198]Based on directions of the splice controller 500, the stream processor 503, In the original stream STOLD, the start code of picture_coding_extension about the picture P3 is looked for, and the value of repeat_first_field in it is rewritten from 0 to 1. Therefore, since repeat field B4' will be generated if the picture P3 by which the value of repeat_first_field was rewritten in this way is decoded, the field will continue in splice point SP1. Similarly, the stream processor 503 looks for the start code of picture_coding_extension about picture P9' in the substitution stream STNEW, and rewrites the value of repeat_first_field in it from 0 to 1. Thus, since repeat field t10' will be generated if picture P9' by which the value of repeat_first_field was rewritten is decoded, the field will continue in splice point SP2. the portion the data element about the

picture B13 was described to be in the stream processor 503 and the original stream STOLD -- the deletion out of the stream STOLD, or a null -- it transposes to data.

[0199]Drawing 23 expresses other examples of processing of the processing about flags explained in drawing 22, such as top_field_first and repeat_first_field. With reference to drawing 23, the 2nd example of processing about flags, such as top_field_first of the splice controller 500 in the splice points SP1 and SP2 and the stream processor 503 and repeat_first_field, is explained.

[0200]In the example of processing shown in drawing 23, the splice controller 500, So that the field [of the program 1 and commercial CM1' in splice point SP1 / a bond] may continue, Rewrite top_field_first of picture B7' which comprises the top field t5 and the bottom field b6 from 1 to 0, and. The stream processor 503 is controlled to rewrite repeat_first_field of picture B7' from 0 to 1. The splice controller 500 so that the field [of the program 2 / a bond] may follow commercial CM1' in splice point SP2, The stream processor 503 is controlled to rewrite top_field_first of the picture B13 which comprises the top field T11 and the bottom field B11 from 1 to 0. The splice controller 500 rewrites top_field_first of the picture B14 which comprises the top field T12 and the bottom field B12 from 1 to 0, and. The stream processor 503 is controlled to rewrite repeat_first_field from 1 to 0.

[0201]According to control of the splice controller 500, the stream processor 503, In the substitution stream STNEW, the start code of picture_coding_extension about picture B7' is looked for, top_field_first in the stream is rewritten from 1 to 0, and repeat_first_field is rewritten from 0 to 1. Therefore, if picture B7' by which the value of top_field_first and repeat_first_field was rewritten in this way is decoded, Since the display time of the bottom field b6 shifts by one frame and repeat field b6' is generated, the field will continue in splice point SP1. Similarly, the stream processor 503 looks for the start code of picture_coding_extension about the picture B13 in the original stream STOLD, and rewrites top_field_first in it from 1 to 0. The stream processor 503 rewrites top_field_first about the picture B14 from 1 to 0 in the original stream STOLD, and it rewrites repeat_first_field from 1 to 0. Therefore, if the pictures B13 and B14 by which the value of top_field_first and repeat_first_field was rewritten in this way are decoded, Since the display time of the bottom fields B11 and B12 shifts by one frame, the field will continue in splice point SP2.

[0202]If the 1st example of processing shown in drawing 22 is compared with the 2nd example of processing shown in drawing 23 here, so that he can understand from drawing 22 (C), Rather than the picture B7 displayed on the beginning of original commercial CM1, since only the 1 field has shifted, picture B7' displayed on the beginning of substituted commercial CM1', Only the 1 field will be in the display timing of substituted commercial CM1'. By 1 field ****** grade, human being's eyes hardly understand a display for the delay. However, since the income has been obtained by broadcasting the commercials from a KURAI and company at a

broadcasting station, it may be required that it should not be late for broadcasting this editing of program 1 grade, and commercials should be correctly broadcast rather than it. When such exact display time is required, the 2nd example of processing shown in drawing 23 is effective. By rewriting top_field_first of picture B7', and the value of repeat_first_field like the 2nd example of processing shown in drawing 23, It can be behind to the picture displayed on the beginning of original commercial CM1, and picture B7' of the beginning of substituted commercial CM1' can be displayed correctly [there is nothing and].

[0203]That is, the locus of the data occupation rate of the VBV buffer of the stream STNEW outputted from the stream processor 503, The locus and compatibility of the data occupation rate of the stream STOLD can be taken, and the compatibility about a field pattern / frame pattern can be taken. [of the VBV buffer] Therefore, by controlling the switching operation of the splicing circuit 504 based on the control signal from the splice controller 500 by splice point SP1. Connect after the stream STOLD and the stream STNEW by splice point SP2. In [are the stream generated by connecting the stream STOLD after the stream STNEW, and] the splice points SP1 and SP2, The spliced stream STSPL to which the locus of the data occupation rate of a VBV buffer is continuing, and the field pattern / frame pattern has become continuously is generated.

[0204]Next, the example about the 2nd splicing processing is described. The example about the 2nd splicing processing, When coding stream STOLD of a transmission program has been transmitted from the head office 30, it is an example about the splicing processing performed when coding commercial CM' inserted newly and generating coding stream STNEW. That is, it is the method of analyzing coding stream STOLD of the transmission program transmitted from the head office 30, and coding commercial CM1' inserted newly based on the analysis result.

[0205]First, transmitted coding stream STOLD is changed into the form of an elementary stream from the form of a transport stream in the stream conversion circuit 44 from the head office 30. Coding stream STOLD changed into the form of the elementary stream is supplied to the stream analysis circuit 502 of the stream splicer 50.

[0206]The stream analysis circuit 502 of the stream splicer 50 is a circuit for analyzing the stream syntax of coding stream STOLD. In the example about this 2nd splicing processing, this stream analysis circuit 502 conducts only analysis of the syntax of coding stream STOLD, and does not conduct analysis of the syntax of the substitution stream STNEW.

[0207]First specifically the stream analysis circuit 502, So that he can understand from the syntax of the coding stream indicated by drawing 10 and drawing 15, By looking for 32-bit picture_start_code described in the original stream STOLD, the place where the information about a picture header was described [be / it / under / stream / setting] is grasped. Next, the stream analysis circuit 502 grasps a picture type by finding picture_coding_type of the triplet which starts 11 bits [of picture_start_code] after, and. vbv_delay of a coding picture can be

grasped from 16-bit vbv_delay described by the next of picture_coding_type of this triplet.
[0208]The stream analysis circuit 502 so that he can understand from the syntax of the coding stream indicated by drawing 10 and drawing 15, By looking for 32-bit extension_start_code described in coding stream STOLD, the place where the information about a picture coding extension was described [be / it / under / stream / setting] is grasped. Next, 1-bit top_field_first the stream analysis circuit 502 was described to be after 25 bits of picture_start_code, The frame structure of a coding picture can be grasped by looking for repeat_first_field described after 6 bits of the top_field_first.
[0209]. The stream analysis circuit 502 was extracted for every picture out of the original stream STOLD. Data elements, such as picture_coding_type, vbv_delay, top_field_first, and repeat_first_field, are supplied to the broadcast system controller 41 via the splice controller 500. There is no necessity of sending the data element of all the pictures of the original stream STOLD, They may be only data elements, such as picture_coding_type of the picture corresponding to commercial CM1 in a transmission program, vbv_delay, top_field_first, and repeat_first_field.
[0210]Next, the broadcast system controller 41 controls the CM server 47 to reproduce the video data of commercial CM1' substituted for the portion of commercial CM of a transmission program. picture_coding_type by which the broadcast system controller 41 was extracted from the original stream STOLD, vbv_delay, top_field_first, and repeat_first_field are supplied to the encoder controller 480 of the encoder block 48.
[0211]picture_coding_type to which the encoder controller 480 was supplied from the broadcast system controller 41, vbv_delay, top_field_first, and repeat_first_field are used and the encoder 481 is controlled to encode the baseband video data of substitution commercial CM1'. Namely, picture_coding_type, vbv_delay, top_field_first, and repeat_first_field of coding stream STOLD of original commercial CM1, picture_coding_type of the stream STNEW which coded substitution commercial CM1', Substitution commercial CM1' is coded so that vbv_delay, top_field_first, and repeat_first_field may completely become the same. As a result, picture_coding_type, vbv_delay, top_field_first, and repeat_first_field of coding stream STOLD of original commercial CM1, The coded stream STNEW with the completely same picture_coding_type, vbv_delay, top_field_first, and repeat_first_field is generated.
[0212]The splice controller 501 switches the input terminal of the switching circuit 501 to "b", and supplies the elementary stream STNEW outputted from the encoder 481 to the stream analysis circuit 502. In the example about this 2nd splicing processing, Since this stream analysis circuit 502 conducts only analysis of the syntax of coding stream STOLD and analysis of the syntax of the substitution stream STNEW is not conducted, the stream STNEW is outputted as it is, without carrying out analysis processing in the stream analysis circuit 502.
[0213]In the example about this 2nd splicing processing, the stream processor 503. Since

stream processing which changes the data element in the stream STOLD outputted from the stream analysis circuit 502 and the stream STNEW is unnecessary, Only matching synchronization processing (frame synchronization) which doubles the frame synchronization of the stream STOLD and the stream STNEW is performed. Specifically this stream processor 503, Until it has a FIFO buffer for several frames and the substitution stream STNEW is outputted from the encoder 481, By buffering the stream STOLD in this FIFO buffer, the frame synchronization of the stream STOLD and the stream STNEW can be doubled. The stream STOLD and the stream STNEW by which frame synchronization doubling processing was carried out are supplied to the splicing circuit 504.
[0214]As for the splice controller 500, in splicing point SP1, the stream STNEW is connected after the stream STOLD, Switching of the splicing circuit 504 is controlled so that the stream STOLD is connected to the next of the stream STNEW in splicing point SP2. As a result, the spliced stream STSPL is outputted from the splicing circuit 504.
[0215]Simply, in the splicing circuit 504, although the stream STOLD and the stream STNEW are only switched, The locus of the data occupation rate of the VBV buffer of the spliced stream STSPL has become continuously, and the frame pattern in a splice point is also continuing. Because, since coding processing of the stream STNEW is carried out based on the analysis result of the syntax of a stream, the original stream STOLD, Since the stream STNEW which was able to take compatibility to the original stream STOLD is generated, the locus of the VBV buffer of the spliced stream STSPL, It is because it is completely the same as the locus of the VBV buffer of the original stream STOLD and the frame structure of the generated spliced stream STSPL is completely the same as that of the original stream STOLD.

[0216]Therefore, according to this 2nd example, the syntax of original coding stream STOLD transmitted from the head office is analyzed, Since substitution commercial CM1' is coded according to the analysis result so that it may have the same stream structure and encoding parameter as coding stream STOLD, When carrying out splicing of coding stream STOLD and coding stream STNEW which were generated according to, respectively, the compatibility of coding stream STOLD and coding stream STNEW is doubled -- things -- splicing could be performed easily, and, as a result, it applied to the MPEG standard correspondingly, and the seamless spliced stream STSPL can be generated.
[0217]Next, the example about the 3rd splicing processing is described. The example about the 3rd splicing processing, As for original commercial CM1, coding stream STOLD reaches, Before generating coding stream STNEW of commercial CM1' substituted, In order to substitute for coding stream STOLD of original commercial CM1 and to code coding stream STNEW of commercial CM1' beforehand, the encoding parameter of ** is determined, It is processing in which original commercial CM1 and substitution commercial CM1' is coded

based on the decided encoding parameter. For example, this encoding parameter is information shown with picture_coding_type, vbv_delay, top_field_first, repeat_first_field, etc. which were already explained, a generation bit amount, etc.
[0218]First, at the head office 30, picture_coding_type, vbv_delay, top_field_first, and repeat_first_field are determined as an encoding parameter for coding original commercial CM1. The broadcast system controller 31 of the head office 30 supplies the encoding parameter to the encoder controller 350 of the MPEG encoder block 35, and it supplies it also to the broadcast system controller 41 of each local station 40 using a communication line.
[0219]picture_coding_type to which the encoder controller 350 was supplied from the broadcast system controller 31, Video encoder 351-1V is controlled to code the video data of original commercial CM1 using encoding parameters, such as vbv_delay, top_field_first, and repeat_first_field. Namely, coding stream STOLD outputted from video encoder 351-1V, It is a stream based on encoding parameters, such as picture_coding_type, vbv_delay, top_field_first, and repeat_first_field.
[0220]Coding stream STOLD outputted from video encoder 351-1V is supplied to the local station 40 via the multiplexer 36 and the modulation circuit 37.
[0221]picture_coding_type to which the local station 40 was supplied from the broadcast system controller 31 of the head office 30 on the other hand, Encoding parameters, such as vbv_delay, top_field_first, and repeat_first_field, are supplied to the encoder controller 480 of the encoder block 48.
[0222]picture_coding_type to which the encoder controller 480 was supplied from the broadcast system controller 41, vbv_delay, top_field_first, and repeat_first_field are used and the encoder 481 is controlled to encode the baseband video data of substitution commercial CM1'. Namely, picture_coding_type, vbv_delay, top_field_first, and repeat_first_field of coding stream STOLD of original commercial CM1, The coded stream STNEW with the completely same picture_coding_type, vbv_delay, top_field_first, and repeat_first_field is generated.
[0223]The splice controller 501 switches the input terminal of the switching circuit 501 to "b", and supplies the elementary stream STNEW outputted from the encoder 481 to the stream analysis circuit 502. In the example about this 3rd splicing processing, this stream analysis circuit 502 does not conduct analysis of the syntax of coding stream STOLD and coding stream STNEW.
[0224]In the example about this 2nd splicing processing, the stream processor 503. Since stream processing which changes the data element in the stream STOLD outputted from the stream analysis circuit 502 and the stream STNEW is unnecessary, Only matching synchronization processing (frame synchronization) which doubles the frame synchronization of the stream STOLD and the stream STNEW is performed. Specifically this stream processor 503, Until it has a FIFO buffer for several frames and the substitution stream STNEW is

outputted from the encoder 481, By buffering the stream STOLD in this FIFO buffer, the frame synchronization of the stream STOLD and the stream STNEW can be doubled. The stream STOLD and the stream STNEW by which frame synchronization doubling processing was carried out are supplied to the splicing circuit 504.

[0225]As for the splice controller 500, in splicing point SP1, the stream STNEW is connected after the stream STOLD, Switching of the splicing circuit 504 is controlled so that the stream STOLD is connected to the next of the stream STNEW in splicing point SP2. As a result, the spliced stream STSPL is outputted from the splicing circuit 504.

[0226]Simply, in the splicing circuit 504, although the stream STOLD and the stream STNEW are only switched, The locus of the data occupation rate of the VBV buffer of the spliced stream STSPL has become continuously, and the frame pattern in a splice point is also continuing. . Because, in the broadcast system controller 31 of the head office 30, were determined beforehand. Encoding parameters, such as picture_coding_type, vbv_delay, top_field_first, and repeat_first_field, are used, It is because original commercial CM1 and substitution commercial CM1' is coded.

[0227]Therefore, according to this 3rd example, the encoding parameter is beforehand determined between the head office and a local station, Coding stream STOLD which coded original commercial CM1 at the head office based on the decided coding PAMETATA is generated, Since he is trying to generate coding stream STNEW which substituted at the head office based on the decided coding PAMETATA, and coded commercial CM1', When carrying out splicing of coding stream STOLD and coding stream STNEW which were generated according to, respectively, the compatibility of coding stream STOLD and coding stream STNEW is doubled -- things -- splicing could be performed easily, and, as a result, it applied to the MPEG standard correspondingly, and the seamless spliced stream STSPL can be generated.

[0228]

[Translation done.]

DESCRIPTION OF DRAWINGS

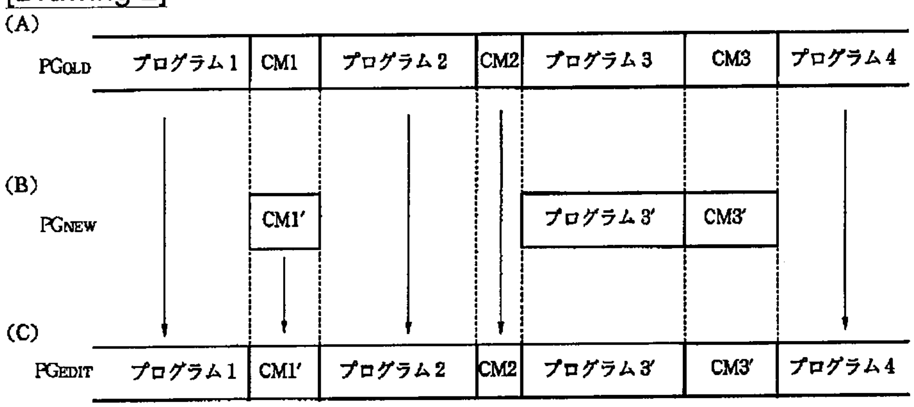
[Brief Description of the Drawings]
[Drawing 1]It is a figure for explaining a common television broadcasting system.
[Drawing 2]It is a figure for explaining the editing processing of the TV program in a local station.
[Drawing 3]It is a figure for explaining the common digital transmission system using an MPEG standard.
[Drawing 4]It is a figure for explaining control of a VBV buffer.
[Drawing 5]It is a figure for explaining 2:3 pulldown processing.
[Drawing 6]It is a figure for explaining the problem generated when splicing processing of the coding stream is carried out.
[Drawing 7]It is a figure showing an entire configuration for the digital broadcasting system containing the coding stream splicing device concerning an embodiment of the invention.
[Drawing 8]It is a block diagram for explaining the composition of the MPEG encoder block 35 of the head office 30, and an encoder block of the local station 40 in detail.
[Drawing 9]It is a figure for explaining processing when generating a transport stream from an elementary stream in a stream conversion circuit.
[Drawing 10]It is a figure for explaining the syntax of the sequence of the video elementary stream of MPEG.
[Drawing 11]It is a figure for explaining the syntax of a sequence header (sequence_header).
[Drawing 12]It is a figure for explaining the syntax of a sequence extension (sequence_extension).
[Drawing 13]It is a figure for explaining the syntax of an extension and user datum (extension_and_user_data).
[Drawing 14]It is a figure for explaining the syntax of a glue PUOBU picture header (group_of_picture_header).

[Drawing 15]It is a figure for explaining the syntax of a picture header (picture_headr).
[Drawing 16]It is a figure for explaining the syntax of a picture coding extension (picture_coding_extension).
[Drawing 17]It is a figure for explaining the syntax of a picture header (picture_data).
[Drawing 18]It is a figure for explaining the syntax of a transport stream packet.
[Drawing 19]It is a figure for explaining the syntax of the adaptation field (adaptation_field).
[Drawing 20]It is a figure for explaining the easy composition of a local station, and the composition of a stream splicer.
[Drawing 21]It is a figure for explaining the processing about the VBV buffer of a stream splicer.
[Drawing 22]It is a figure for explaining the 1st example of processing about top_field_first and repeat_first_field of a stream splicer.
[Drawing 23]It is a figure for explaining the 2nd example of processing about top_field_first and repeat_first_field of a stream splicer.
[Description of Notations]
31 A broadcast system controller and 32. A raw material server, 33 CM server, and 34. A matrix switcher block and 35. An MPEG encoder block and 36 A multiplexer, 37 A modulation circuit and 41 A broadcast system controller, 42 A demodulator circuit and 43 A demultiplexer, 44 A stream conversion circuit and 46 [A stream splicer and 51 / A stream conversion circuit and 52 / A multiplexer and 53 / A modulation circuit, 61, 62 homes] A raw material server, 47 CM server, and 48 An encoder block and 49 A stream server and 50

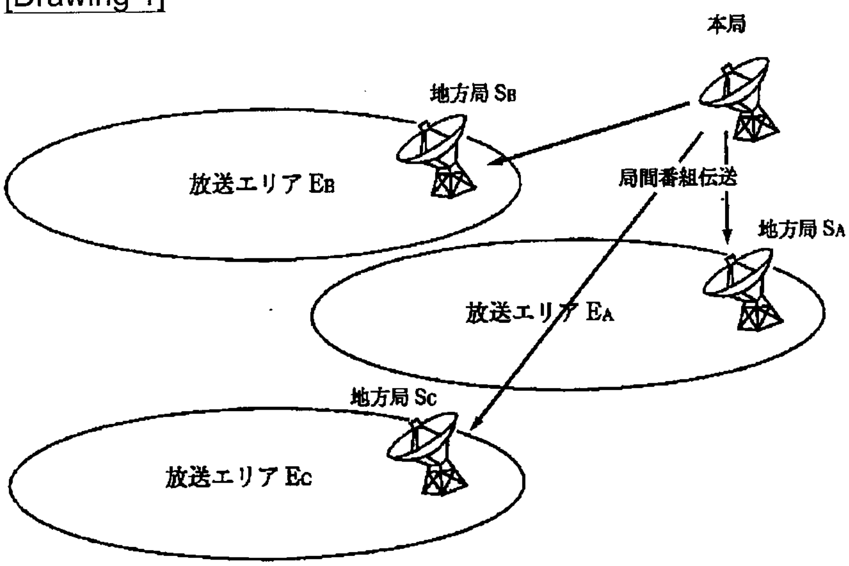
[Translation done.]

DRAWINGS

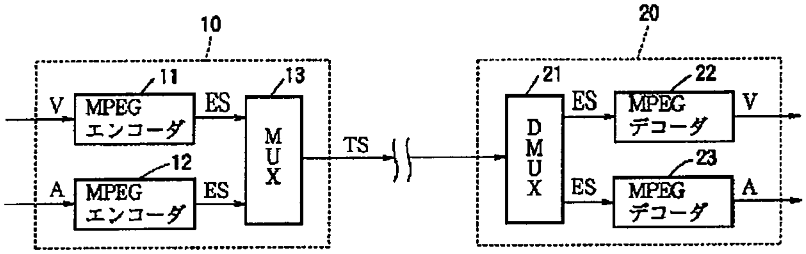
[Drawing 2]



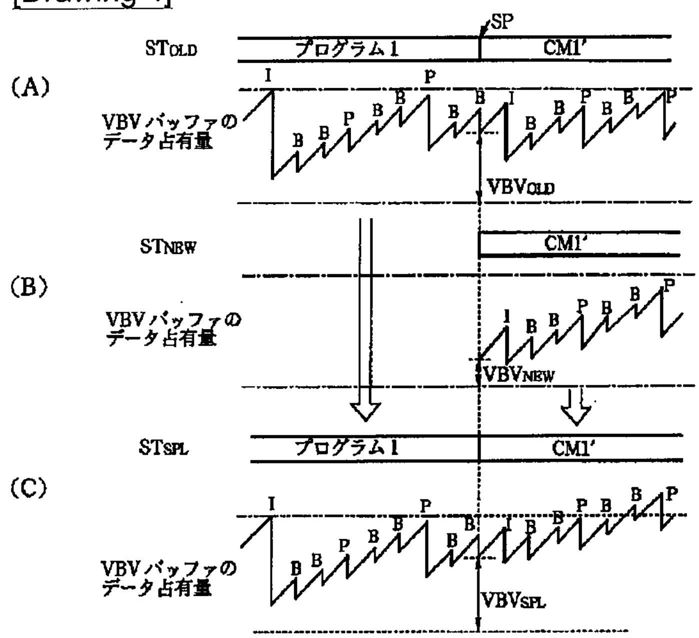
[Drawing 1]



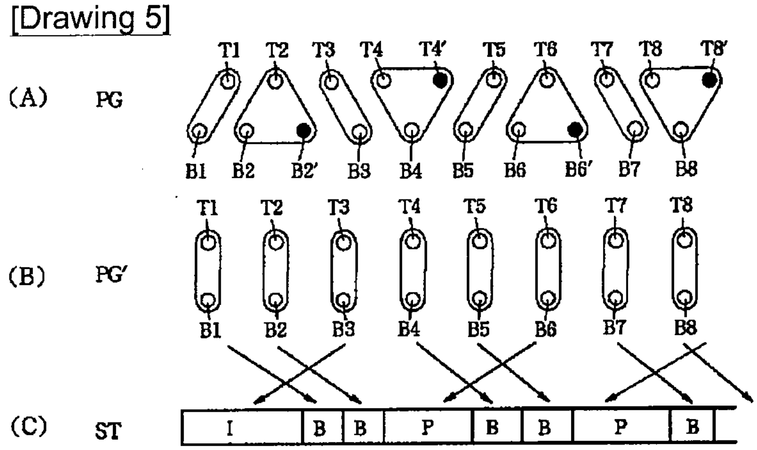
[Drawing 3]



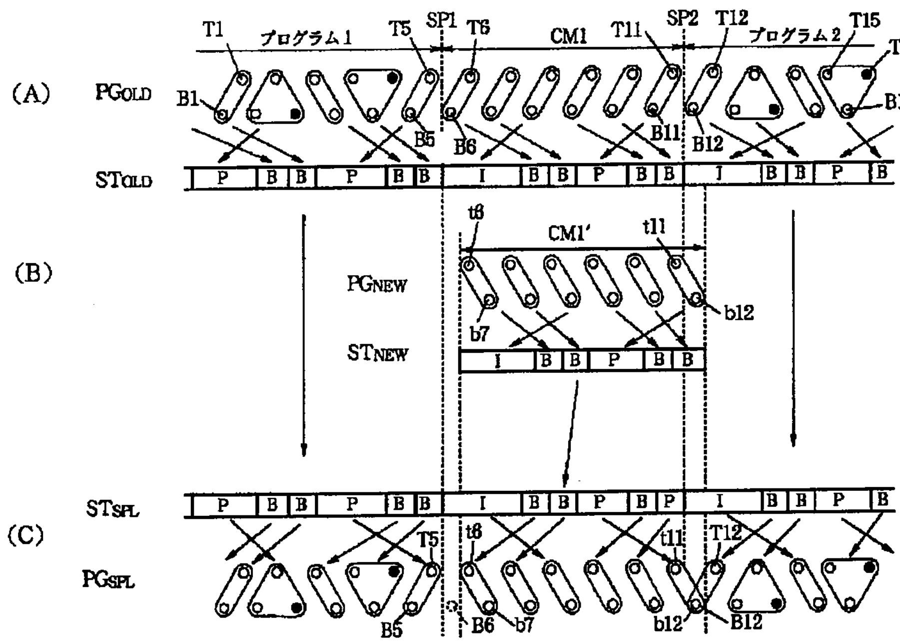
[Drawing 4]



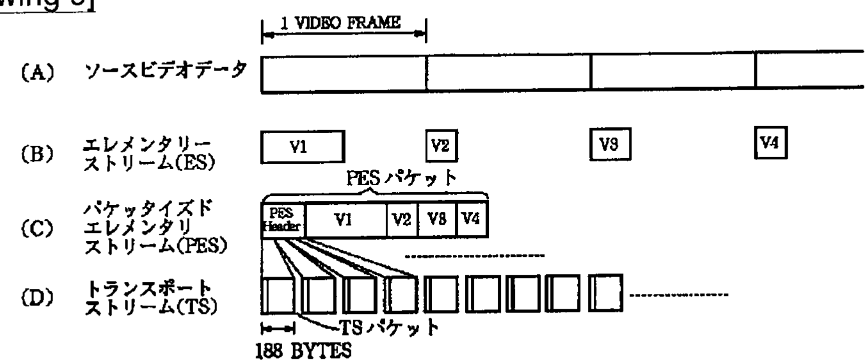
[Drawing 5]



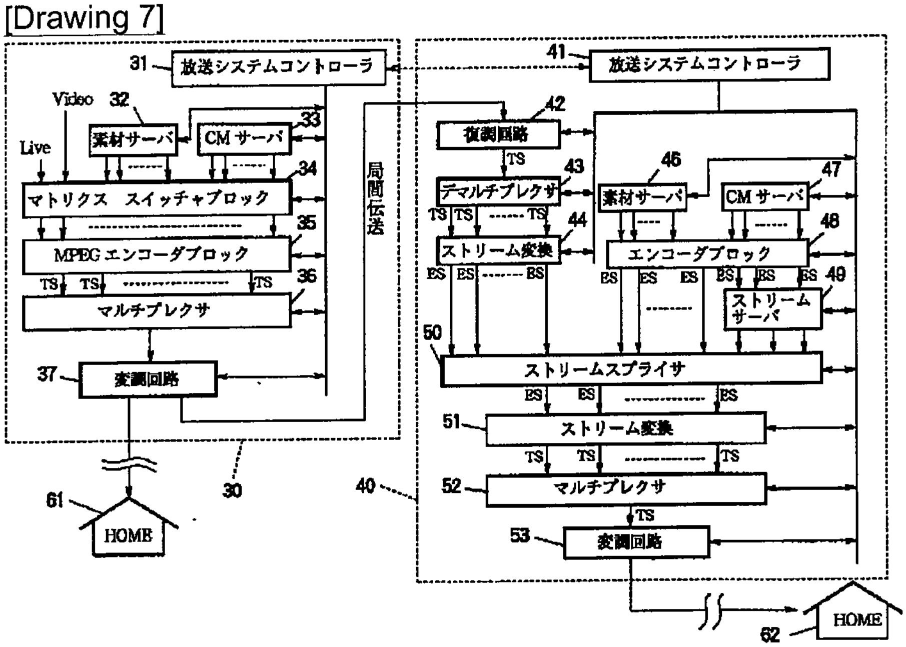
[Drawing 6]



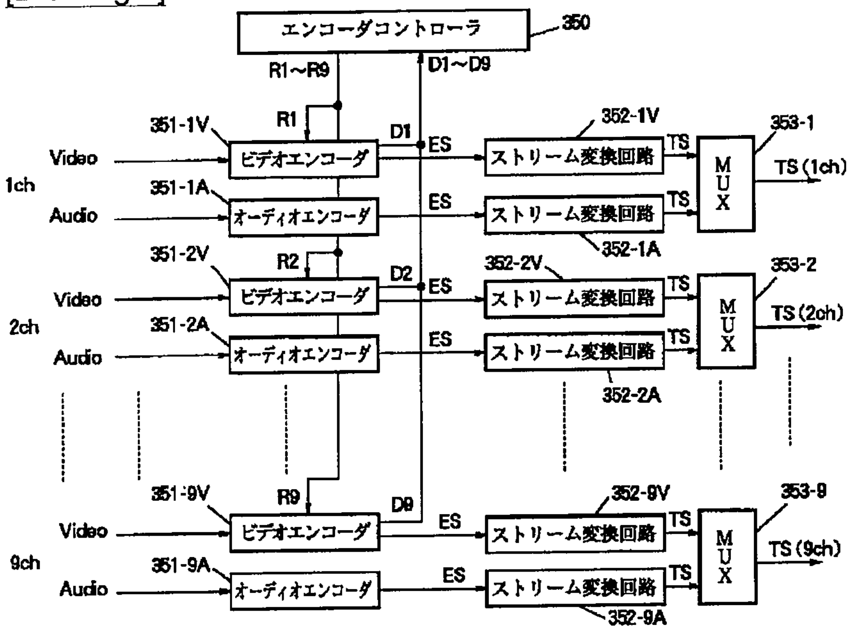
[Drawing 9]



[Drawing 7]



[Drawing 8]



[Drawing 17]

ピクチャデータ

picture_data ( ) {	ビット数	ニーモニック
do {		
slice ( )		
} while (nextbits ( )==slice_start_code)		
next_start_code ( )		
}		

[Drawing 10]

video_sequence ( ) {	ビット数	ニーモニック
next_start_code ( )		
sequence_header ( )		
sequence_extension ( )		
do {		
extension_and_user_data (0)		
do {		
if (nextbits ( )==group_start_code) {		
group_of_pictures_header ( )		
extension_and_user_data ( )		
}		
picture_header ( )		
picture_coding_extension ( )		
extension_and_user_data (2)		
picture_data ( )		
} while ((nextbits ( )==picture_start_code)||		
(nextbits ( )==group_start_code))		
if (nextbits ( )! = sequence_end_code) {		
sequence_header ( )		
sequence_extension ( )		
}		
} while (nextbits ( )! = sequence_end_code)		
sequence_end_code	32	bslbf
)		

[Drawing 13]

拡張データおよびユーザデータ

extension_and_user_data (i) {	ビット数	ニーモニック
while (((il=1) its ( )&&(nextbits ( ) extension_start_code)) ||		
(nextbits ( )==user_data_start_code)) {		
if (nextbitS ( )==extension_start_code)		
extension_data (i)		
if (nextbits ( )=user_data_start_code)		
user_data ( )		
}		
}		

[Drawing 11]

シーケンスヘッダ

sequence_header ( ) {	ビット数	ニーモニック
sequence_header_code	32	bslbf
horizontal_size_value	12	uimsbf
vertical_size_value	12	uimsbf
aspect_ratio_information	4	uimsbf
frame_rate_code	4	uimsbf
bit_rate_value	18	uimsbf
marker_bit	1	"1"
vbv_buffer_size_value	10	uimsbf
constrained_parameters_flag	1	
load_intra_quantise_matrix	1	
if (load_intra_quantiser_matrix)		
intra_quantiser_matrix [64]	8*64	uimsbf
load_non_intra_quantiser_matrix	1	
if (load_non_intra_quantiser_matrix)		
non_intra_quantiser_matrix [64]	8*64	uimsbf
next_start_code ( )		
}		

[Drawing 12]

シーケンス拡張

sequence_extension ( ) {	ビット	ニーモニック
extension_start_code	32	bslbf
extension_start_code_identifier	4	uimsbf
profile_and_level_indentifier	8	uimsbf
progressive_sequence	1	uimsbf
chroma_format	2	uimsbf
horizontal_size_extension	2	uimsbf
vertical_size_extension	2	uimsbf
bit_rate_extension	12	uimsbf
marker_bit	1	bsalbf
vbv_buffer_size_extension	8	uimsbf
low_dalay	1	uimsbf
frame_rate_extension_n	2	uimsbf
frame_rate_extension_d	5	uimsbf
next_start_code ( )		
}		

[Drawing 14]

グループオブピクチャヘッダ

group_of_picture_header ( ) {	ビット数	ニーモニック
group_start_code	32	bslbf
time_code	25	bslbf
cloused_gop	1	uimsbf
broken_link	1	uimsbf
next_start_code ( )		
}		

[Drawing 15]

ピクチャヘッダ

picture header ( ) {	ビット数	ニーモニック
picture_start_code	32	bslbf
tenporal_reference	10	uimsbf
picture_coding_type	3	uimsbf
vbv_delay	16	uimsbf
if (picture_coding_type==2‖picture_coding__type==3) {		
full_pel_forward_vector	1	
forward_f_code	3	uimsbf
}		
if (picture_coding_type==3) {		
full_pel_backward_vector	1	
backward_f_code	3	uimsbf
}		
while (nextbits ( )==' 1') {		
extra_bit_picture／＊with the value "1"＊／	1	uimsbf
extra_information_picture	8	
}		
extra_bit_picture／＊with the value "0"＊／	1	uimsbf
next_start_code ( ) t		
}		

[Drawing 16]

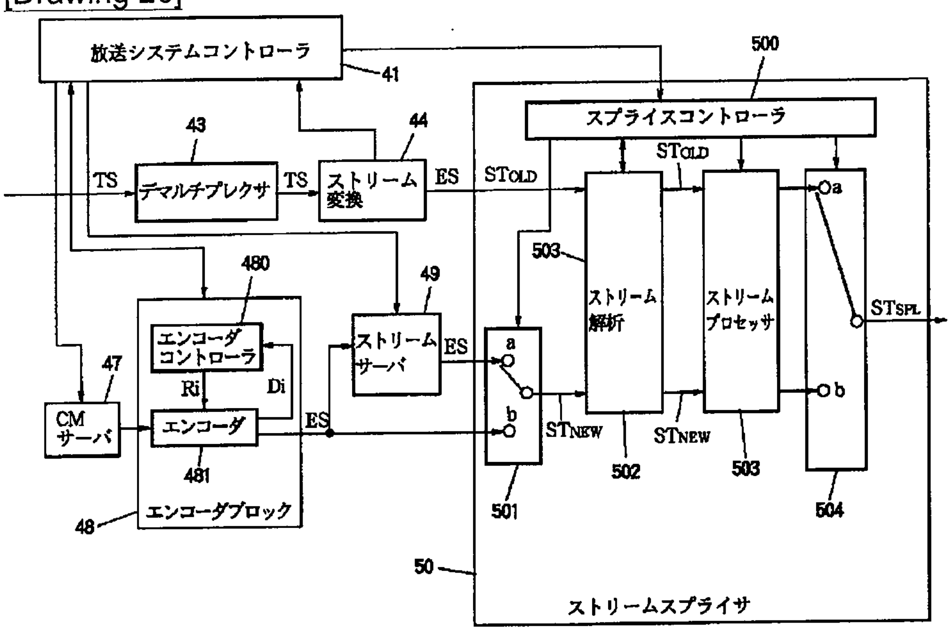
ピクチャコーディング拡張

picture_coding_extension ( ) {	ビット数	ニーモニック
extension_start_code	32	bslbf
extension_start_code_identifier	4	uimsbf
f_code [0] [0] ／＊forward horizontal＊／	4	uimsbf
f_code [0] [1] ／＊forward vertical＊／	4	uimsbf
f_code [1] [0] ／＊backward horizontal＊／	4	uimsbf
f_code [1] [1] ／＊backward vertical＊／	4	uimsbf
intra_dc_precision	2	uimsbf
picture_structure	2	uimsbf
top__field__first	1	uimsbf
frame_pred_frame_dct	1	uimsbf
concealment_motion_vectors	1	uimsbf
q_scale_type	1	uimsbf
intra_vlc_format	1	uimsbf
alternate_scan	1	uimsbf
repeat_first_field	1	uimsbf
chroma_420_type	1	uimsbf
progressive_frame	1	uimsbf
composite_display_flag	1	uimsbf
if (composite_display_flag) {		
v_axis	1	uimsbf
field_sequence	3	uimsbf
sub_carrier	1	uimsbf
burst_amplitude	7	uimsbf
sub_carrier_phase	8	uimsbf
}		
next_start_code ( )		
}		

[Drawing 18]

シンタックス	ビット数	ニーモニック
transport packet ( ) {		
sync_byte	8	bslbf
transport_error_indicator	1	bslbf
payload_unit_start_indicator	1	bslbf
transport_priority	1	bslbf
PID	13	uimsbf
transport_scrambling_control	2	bslbf
adaptaion_field_control	2	bslbf
continuity_counter	4	uimsbf
if (adaptation_field_control==' || adaptation_field_control==' 11') {		
adaptation field ( )		
}		
if (adaptation_field_control==' || adaptation_field_control==' 11') {		
for (i=0 ; 1<N ; i+t) {		
data_byte	8	bslbf
}		
}		
}		

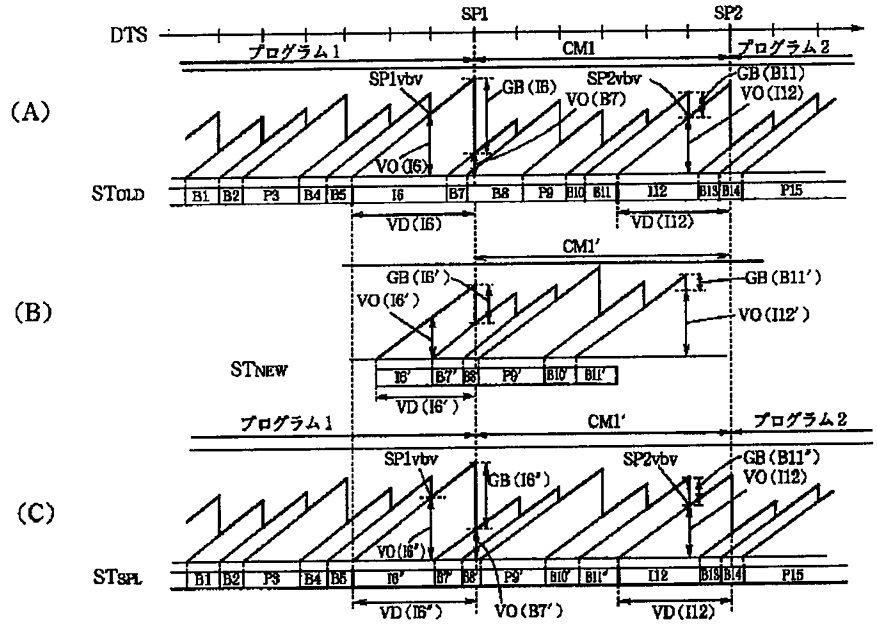
[Drawing 20]



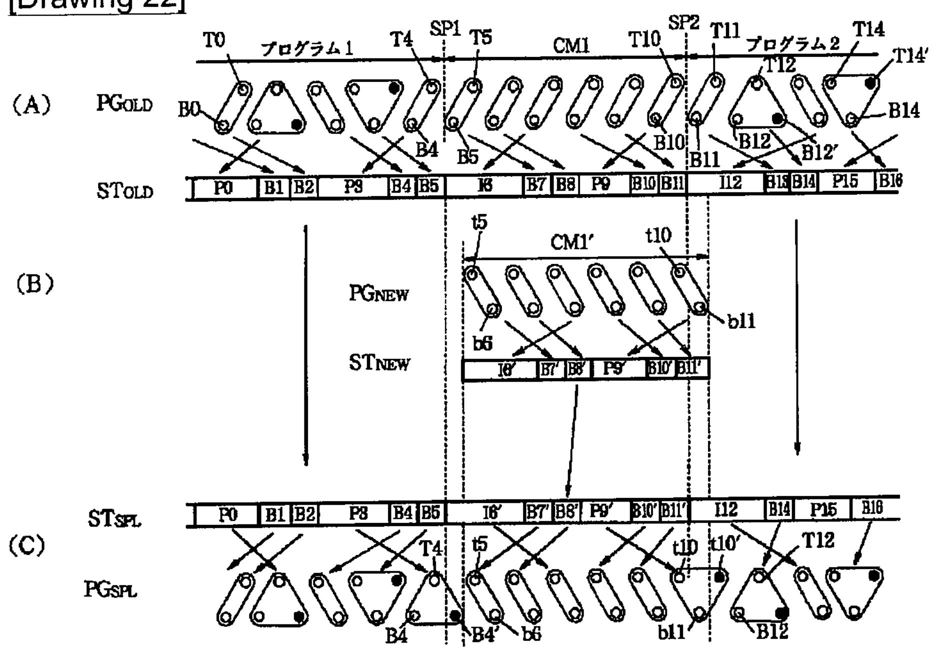
[Drawing 19]

シンタックス	ビット数	ニーモニック
adaptation_field() {		
adaptation_field_length	8	unimbf
if (adaptation_field_length>0) {		
discontinuity_indicator	1	bslbf
random access_indicator	1	bslbf
elementary_stream_priority_indicator	1	bslbf
PCR_flag	1	bslbf
OPCR_flag	1	bslbf
splicing_point_flag	1	bslbf
transport_private_data_flag	1	bslbf
adaptation_field_extension_flag	1	bslbf
if (PCR_flag==' 1') {		
program_clock_refernce_base	33	uimsbf
reserved	6	bslbf
progrqam_clock_reference_extension	9	uimsbf
}		
if (OPCR)_flag==' 1') {		
original_program_clock_reference_base	33	uimsbf
reserved	6	bslbf
original_program_clock_reference_extension	9	uimsbf
}		
if (splicing_point_flag==' 1') {		
splice_countdown	8	tcimsbf
}		
if (transport_private_data_flag==' 1') {		
transport_private_data_length	8	uimsbf
for (i=0 ; i< transport_private_data_length ; i+t) {		
provate_data_byte	8	bslbf
}		
}		
if (adaptation_field_extension_flag==' 1') {		
adaptation_field_extension_length	8	unimsbf
ltw_flag	1	bslbf
piecewise_rate_flag	1	bslbf
seamless_splice_flag	1	bslbf
reserved	5	bslbf
if (ltw_flag==' 1') {		
Itw_valid_flag	1	bslbf
ltw_offset	15	unimsbf
}		
if (plecewise_rate_flag-=' 1') {		
reserved	2	bslbf
piecewise_rate	22	uimsbf
}		
if (seamless_splice_flag==' 1') {		
splice_type	4	bslbf
DTS_next_AU [32..30]	3	bslbf
marker_bit	1	bslbf
DTS_next_AU [29..15]	15	bslbf
marker_bit	1	bslbf
DTS_next_AU [14..0]	15	bslbf
maker_bit	1	bslbf
}		
for (i=0 ; i<N ; i++) {		
reserved	8	bslbf
}		
for (i=0 ; i<N ; i++) {		
stuffing__byte	8	bslbf
}		
}		
}		

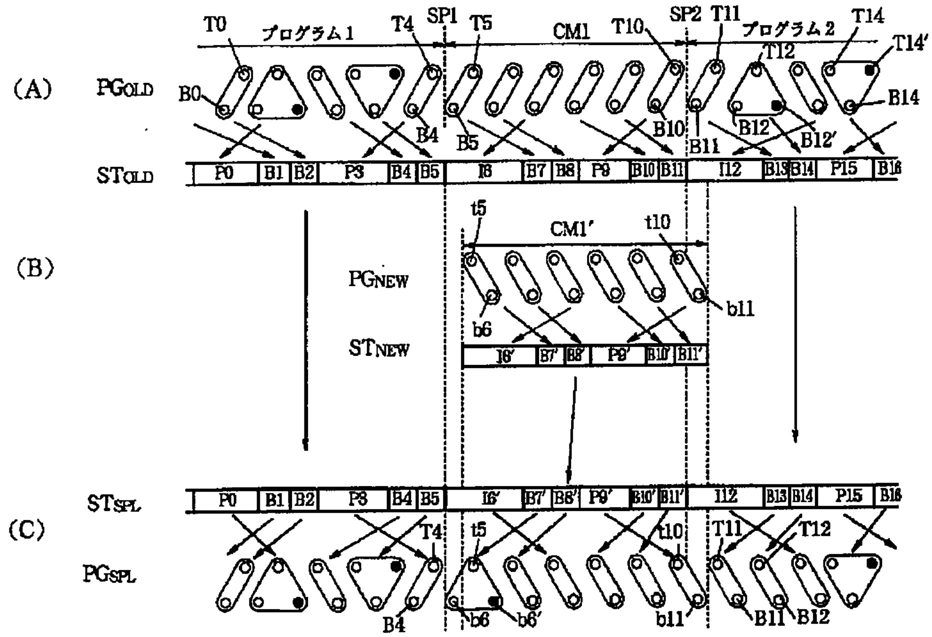
[Drawing 21]



[Drawing 22]



[Drawing 23]



[Translation done.]

CORRECTION OR AMENDMENT

[Kind of official gazette]Printing of amendment by regulation of 2 of Article 17 of Patent Law
[Section classification] The 3rd classification of the part VII gate
[Publication date]September 27, Heisei 14 (2002.9.27)

[Publication No.]JP,11-220655,A
[Date of Publication]August 10, Heisei 11 (1999.8.10)
[Annual volume number] Publication of patent applications 11-2207
[Application number]Japanese Patent Application No. 10-282609
[The 7th edition of International Patent Classification]

H04N 5/268

H04H 1/00

H04J 3/00

H04N 7/24
[FI]

H04N 5/268

H04H 1/00 A

H04J 3/00 M

H04N 7/13 Z
[Written amendment]
[Filing date]July 8, Heisei 14 (2002.7.8)
[Amendment 1]

[Document to be Amended]Specification
[Item(s) to be Amended]0029
[Method of Amendment]Change
[Proposed Amendment]
[0029]In an MPEG standard, it defines that the first field describes the flag 'top_field_first' which shows a top field or a bottom field, in a coding stream between the two fields which constitute a frame. When "top_field_first" is "1", specifically, It is shown that a top field is the early frame structure in time than a bottom field, and when "top_field_first" is "0", it is shown that a bottom field is the early frame structure in time than a top field.
[Amendment 2]
[Document to be Amended]Specification
[Item(s) to be Amended]0073
[Method of Amendment]Change
[Proposed Amendment]
[0073]Drawing 8 is a block diagram for explaining the composition of the MPEG encoder block 35 of the head office 30, and the encoder block 48 of the local station 40 in detail. Since the MPEG encoder block 35 of the head office 30 and the encoder block 48 of the local station 40 are the same composition substantially, the MPEG encoder block 35 of the head office 30 is mentioned as an example, and the composition and function are explained.
[Amendment 3]
[Document to be Amended]Specification
[Item(s) to be Amended]0094
[Method of Amendment]Change
[Proposed Amendment]
[0094]The do{}while syntax arranged after this extension_and_user_data (0) function, {} of do [while the conditions defined by the while sentence are truth] sentence -- the data element described based on the inner function is a function which shows what is described by the bit stream. The nextbits() function currently used in this while sentence, It is a function for judging coincidence with the bit or bit string which appears in a bit stream, and picture_start_code or group_start_code, When the bit or bit string which appears in a bit stream, and picture_start_code or group_start_code is in agreement, the conditions defined by the while sentence serve as truth. Therefore, when picture_start_code or group_start_code appears in encoded bit streams, this do{}while syntax. It is shown that the code of the data element defined by the function in the start code, next do sentence is described.
[Amendment 4]
[Document to be Amended]Specification
[Item(s) to be Amended]0139

[Method of Amendment]Change
[Proposed Amendment]
[0139]Drawing 19 is a figure for explaining the syntax of adaptation_field(). This adaptation_field(), adaptation_field_length, discontinuity_indicator, randam_access_indicator, elemntary_stream_priority_indicator, OPCR_flag, splicing_point_flag, transport_private_data_flag, adaptation_field_extension_flag, program_clock_reference (PCR), original_program_clock_reference (OPCR), splice_countdown, transport_private_data_length, private_data, adaptation_field_extension_length, It comprises the various fields, such as ltw_flag (leagal_time_window_flag), piecewise_rate_flag, and seamless_splice_flag.
[Amendment 5]
[Document to be Amended]Specification
[Item(s) to be Amended]0141
[Method of Amendment]Change
[Proposed Amendment]
[0141]discontinuity_indicator is data in which it is shown whether a program clock reference (PCR) is reset and the program clock reference is discontinuous in the middle of two or more packets which have the same PID. When a program clock reference is discontinuous, this discontinuity_indicator is set to "1", and this discontinuity_indicator is set to "0" when the program clock reference is continuing. This program clock reference is the reference information for setting it as the timing which meant the value of the system time clock by the side of a decoder to the encoder side in an MPEG decoder for video and an audio to decode.
[Amendment 6]
[Document to be Amended]Specification
[Item(s) to be Amended]0168
[Method of Amendment]Change
[Proposed Amendment]
[0168]The stream analysis circuit 502 so that he can understand from the syntax of the coding stream indicated by drawing 10 and drawing 15, By looking for 32-bit extension_start_code described in coding stream STOLD and coding stream STNEW, the place where the information about a picture coding extension was described [be / it / under / stream / setting] is grasped. Next, 1-bit top_field_first the stream analysis circuit 502 was described to be after 25 bits of picture_start_code, The frame structure of a coding picture can be grasped by looking for repeat_first_field described after 6 bits of the top_field_first. For example, when "top_field_first" of a coding picture is "1." It is shown that a top field is the early frame structure in time than a bottom field, and when "top_field_first" is "0", it is shown that a bottom field is the early frame structure in time than a top field. When the flag "top_field_first" in a coding stream is "0" and "repeat_first_field" is "1", It is shown that it is the picture structure that a repeat field

is generated from a top field at the time of decryption, Having the picture structure that the flag "top_field_first" in a coding stream is "0", and a repeat field is generated from a bottom field at the time of decryption when "repeat_first_field" is "1" is shown.

[Amendment 7]

[Document to be Amended]Specification

[Item(s) to be Amended]0180

[Method of Amendment]Change

[Proposed Amendment]

[0180]The value of vbv_delay in the substitution stream STNEW is only rewritten from VD (I6') to VD (I6) here, Since the generation bit amount of picture I6' is insufficient when it tries to pull out a bit stream from a VBV buffer according to this rewritten vbv_delay, a VBV buffer will carry out underflow. Then, the splice controller 500 the generation bit amount GB (I6') of picture I6' of the substitution stream STNEW, Processing which inserts stuffing bytes to picture I6' of the substitution stream STNEW is performed so that it may become the generation bit amount GB (I6") of picture I6" of the seamless spliced stream STSPL. These stuffing bytes are data which comprises dummy bits of "0."

[Amendment 8]

[Document to be Amended]Specification

[Item(s) to be Amended]0202

[Method of Amendment]Change

[Proposed Amendment]

[0202]If the 1st example of processing shown in drawing 22 is compared with the 2nd example of processing shown in drawing 23 here, so that he can understand from drawing 22 (C), Rather than the picture B7 displayed on the beginning of original commercial CM1, since only the 1 field has shifted, picture B7' displayed on the beginning of substituted commercial CM1', Only the 1 field will be in the display timing of substituted commercial CM1'. By 1 field ****** grade, human being's eyes hardly understand a display for the delay. However, since the income has been obtained by broadcasting the commercials from a client company at a broadcasting station, it may be required that it should not be late for broadcasting this editing of program 1 grade, and commercials should be correctly broadcast rather than it. When such exact display time is required, the 2nd example of processing shown in drawing 23 is effective. By rewriting top_field_first of picture B7', and the value of repeat_first_field like the 2nd example of processing shown in drawing 23, It can be behind to the picture displayed on the beginning of original commercial CM1, and picture B7' of the beginning of substituted commercial CM1' can be displayed correctly [there is nothing and].

[Translation done.]